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A thesis submitted in partial fulfilment of the requirements of the Master of Science Education Geography

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DECLARATION

I, Kundhlande Agnes Ndiudzeyi, do hereby declare that this dissertation is a result my original work and has not been presented elsewhere for the purpose of degree assessment. All additional sources of information have been acknowledged by means of references.

Student

..........................

Date..........................
DEDICATION

This thesis work is dedicated to my husband, Joseph, and my children Gamuchirai, Nyasha and Tadiwanashe who have been a constant source of support and encouragement during the challenges of graduate school and life. I am truly thankful for having you in my life. This work is also dedicated to my parents, Anna Tsurusai and Wilbert Vukai and my uncle Lloyd who have always loved me unconditionally and who taught me the value of education and did all in their power to enable me to pursue my academic dreams.
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ABSTRACT

The purpose of this study was to give a diagnosis of the existence of knowledge and skills gaps in A-Level Geography graduates. The objectives of the study included the following: to identify and describe the A-Level Geography knowledge and skills gaps that exist in post A-level Geography students, to explain the causes of the identified skills and knowledge gaps and to suggest possible changes to the Geography curriculum that may reduce the identified skills and knowledge gaps. The descriptive survey was employed and made use of students in schools and tertiary institutions in Mutare urban. The study had a target population of 9 schools, 360 students, 9 teachers and 2 tertiary institutions. Stratified sampling was used to select the schools. Random sampling was used in selecting the students. A sample of 30% was used in selecting the schools and students. A sample of 67 % was used in selecting the teachers. The study used questionnaires and interview schedules for collecting data. The analysed data was presented using tables, pie charts, and bar graphs. The study found out that knowledge and skills gaps in A-Level Geography graduates were prevalent in both physical geography and human geography. Serious gaps were also noted in fieldwork for both human and physical geography. The study identified the following as causes for these knowledge and skills gaps: teacher competencies, pupil factors, syllabus expectations and school conditions. The study came up with some intervention strategies which include, reviewing the curriculum, improving time management, use of 21st century teaching approaches, increasing support materials from various stakes and promotion of district geography subject clusters. The study recommends the integration of Geography topics and the use of science and mathematics in the teaching of geography to reduce creation of knowledge and skills gaps.
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CHAPTER 1
INTRODUCTION

1.0 Introduction to Chapter 1

Over the years, the Geography Advanced level curriculum has undergone some changes in content, breadth and depth as well as methodology. These changes seem to have created both knowledge and skills gaps. The knowledge and skills gaps have manifested themselves in post Advanced Level graduates admitted into geography-related programmes in tertiary institutions and other sectors of the economy. This study seeks to give a diagnosis of the impact of the Advanced Level geography curriculum on the acquisition of relevant knowledge and skills. The research is based on a study of selected Mutare urban schools that offer A-level Geography and, covers the period from 2010 to 2014. Qualitative descriptive survey research design was used in the study. This chapter gives an outline of the background and purpose of the study, statement of the problem, the research questions, as well as definition of terms with a contextual meaning. Evaluations of expected challenges as well as some ethical issues related to the study are also discussed.

1.1 Background to the study

Some comments expressed by lecturers manning geography departments at tertiary institutions in and around Mutare, notably Mutare Teachers’ College, Mary Mount Teachers’ College and Africa University, seemed to suggest that A-level graduates lacked some fundamental knowledge and skills in geography. These observations were also echoed by the geography subject Education Officer for Manicaland. These comments are coming against the background of above 50% pass rates trends in the subject at most Mutare urban schools over the past five years (Table 1.1).

Table 1.1 A-Level geography pass rate trends for some urban schools in Mutare

<table>
<thead>
<tr>
<th>School</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dangamvura High</td>
<td>55</td>
<td>70</td>
<td>78</td>
<td>65</td>
<td>31</td>
</tr>
<tr>
<td>Nyamauru</td>
<td>87</td>
<td>86</td>
<td>91</td>
<td>64</td>
<td>74</td>
</tr>
<tr>
<td>Sakubva 1</td>
<td>-</td>
<td>86</td>
<td>63</td>
<td>60</td>
<td>79</td>
</tr>
</tbody>
</table>

Source: Field Data
There appears, therefore, to be a mismatch between the knowledge and skills evaluated by the ZIMSEC examination and the knowledge and skills expected by the tertiary institutions. A number of questions arise from these observations. For example, is the A-level curriculum failing to address the needs of tertiary institutions which are the consumers of the school products? Is the examination not evaluating the acquisition of the expected knowledge and skills? Is the methodology being used in teaching the A-level curriculum ensuring concepts and skills acquisition by students or is it just encouraging rote learning for purposes of passing the examination? Are there indeed knowledge and skills gaps as noted by the tertiary institutions? These are fundamental questions that need to be addressed – hence this study. The focus of this study was therefore to diagnose the existence of these gaps, their causes and possible remedies.

1.2 Statement of the problem
Observations seem to reveal that Advanced Level geography graduates are leaving High schools with notable knowledge and skills gaps. This research, seeks to establish the extent to which knowledge and skills gaps exist in A-level graduates with a view to identify possible causes and suggest possible remedies. The knowledge and skills gaps affect institutions of higher learning such as universities and teacher training colleges. There has been no attempt to evaluate the suitability of the A-level curriculum to the needs of tertiary institutions in Zimbabwe hence no interventions strategies have been implemented. However, there are plans by the Zimbabwean government to introduce Science, Technology, Engineering and Mathematics (Stem) methodologies in the teaching of Geography at all levels. This study will also serve as one of the intervention strategies. If these gaps are not addressed, the nation will amass A-level Geography graduates who are incompetent. Upon training as teachers, the deficiencies will be transferred to the pupils - thus creating a serious vicious cycle.

1.3 Objectives
The objectives of the study were to:
1.3.1 identify and describe the A-level Geography knowledge and skills gaps that exist in post A-level Geography students.

1.3.2 explain the causes of the identified skills and knowledge gaps and
1.3.3 suggest possible changes to the Geography curriculum that may reduce the identified skills and knowledge gaps.

1.4 Research questions
1.4.1 Which knowledge and skills gaps exist in Advanced Level Geography graduates?
1.4.2 What are the causes of the identified knowledge and skills gaps?
1.4.3 Which measures and curriculum reforms need to be undertaken to reduce the identified knowledge and skills gaps in the Advanced Level Geography graduates?

1.5 Significance of the study
The A-level curriculum is not an end in itself but is meant to prepare students for further training at universities and other tertiary institutions. The extent to which the current ZIMSEC A-level geography curriculum is tailored to meet the expectations of these tertiary institutions has not been established – hence this study. It is envisaged that the findings of this study would benefit, the A-level teachers who facilitate the implementation of the curriculum, the tertiary institutions who admit the A-level graduates into their training programmes, the A-level graduates themselves who are the intended learners of the skills and knowledge thereof inculcated, employers of the graduates from the tertiary institutions, the government and the community at large.

1.5.1 Benefits to the advanced level geography teacher
The research findings equip Advanced Level geography teachers with the necessary skills to enable them to be innovative in tackling the Advanced Level curriculum, and to experiment on the solutions proffered. Further studies can be carried out on these different solutions so as to ascertain their efficacy in reducing the knowledge and skills gaps. It is quite possible that the content, breadth and depth of the curriculum are not the cause of the knowledge and skills gaps noted but rather the teaching methods being employed by the teacher. It is common knowledge that the majority of teachers now teach for the examination and not for concept mastery.

1.5.2 Benefits to tertiary institutions
The tertiary institutions which enrol the Advanced Level Geography graduates will also benefit from the results of the research, enabling them to design their curricula in a way that
aims at closing the gaps and ensuring an end product equipped with adequate skills and knowledge for the job market in various fields. As they design their curricula, they need to be aware of what their students already know as they enter college and build from the known to the unknown.

1.5.3 Benefits to A-level students
The study will help the learners to identify and address the knowledge and skills gaps. Students are the clients and they must get a full benefit from their education. Awareness of these knowledge and skills gaps will help students to create time, seek resources, collaborate and innovate in order to reduce these gaps.

1.5.4 Benefits to the community
To the community at large the findings will enable it to have an appreciation of the occurrence of knowledge and skills gaps in A-level graduates and the ripple effect to tertiary institutions. This will help the community at large to understand the causes of the knowledge and skills gaps and therefore formulate measures to eliminate the gaps.

1.5.5 Benefits to the employers
The employers will also benefit from the research findings. Information on knowledge and skills gaps will enable them to design appropriate intervention programmes. By taking the educational background of their employees into account, employers can facilitate their motivation and attitudes towards work and learning (Evans, 2009). Such training and development is necessary for equipping the employees with relevant skills for job satisfaction.

1.5.6 Benefits to the government
The government through the ministry of education is the other intended beneficiary of the research findings. Causes of such skills and knowledge gaps enable the government to consider curriculum reforms aimed at designing a more relevant and viable Advanced Level geography curriculum capable of producing graduates who are able to fit well into the job market as well as solve the day to day problems of society today. The curriculum should equip the graduates with relevant life skills and knowledge for survival in a wide range of settings.
1.6 Definition of terms

Terms with a contextual meaning used in this study include the following:

1.6.1 Curriculum
Some scholars view the curriculum of a school as what is officially taught in lessons as reflected on the time table (Lawton, 2012). Other scholars have a broader sense of the term curriculum to include all the learning planned and guided by the school. It may include activities by individuals or groups and these may either be carried inside or outside the classroom (Kerr, 1968, as cited in Lawton, 2012). In this research, the term curriculum is defined as the set of skills and knowledge a student at Advanced Level is to acquire in the process of learning. This knowledge and these skills may be acquired through a wide range of activities involving both the teacher and the student in a wide range of environments both in and outside the classroom. Thus the word refers to the syllabus content and skills as well as the methodology of teaching these.

1.6.2 Knowledge
The research is focusing on codified knowledge. This is knowledge that is explicit and well supported by text books and formal teaching (Daniels, 2009). In this study the term knowledge includes geographical concepts and facts acquired by A-level learners through experiences facilitated by the teacher - concepts and facts grounded in justifiable empirical evidence as opposed to conjunctures or opinions.

1.6.3 Knowledge gap
This refers to an analysis of content to find out where the existing content does not meet the desired goals (Bos, 2010). The term therefore refers to ‘missing links’ in terms of expected knowledge levels (Rodriguez & Yanez, 2014). Thus content gaps describe a situation where information or knowledge expected in individuals is missing. The Advanced Level graduate, in this case, does not know what they are supposed to know, but the syllabus they went through stipulates the knowledge expectations. The difference between what they know and what they are supposed to know as prescribed by the syllabus constitute the knowledge gaps.

1.6.4 Skills gap
Skills gap is a significant gap between an organisation’s current capabilities and the skills it needs in order to achieve its goals (Claghorn, *et al.*, 2013). The term skills gaps in this research is used to refer to the gap between the skills that students are required to acquire at Advanced level and the skills they actually possess on completion of the Advanced Level studies. It represents the absence of requisite skills - such as graphicacy and numeracy - that are stipulated in the Advanced Level syllabus.

1.6.5 Advanced Level graduate

A graduate is a person with a degree or one who is educationally elite (Roberts, 2006). An Advanced Level graduate, as used in this study, refers to a school leaver who has sat for the ZIMSEC Advanced Level examination in Geography and obtained a grade E or better.

1.6.6 Information Communication Technology [ICT]

ICT is an umbrella abbreviation that includes any communication device or application. It encompasses: radio, television, cellular phones, satellite systems, computer and network hardware and software, as well as the various services and applications associated with them, such as video-conferencing and distance learning (Hajdin, 2008). This definition is the one used in this research.

1.6.7 Stem education

This is a curriculum based on the idea of educating students in four specific disciplines namely, science, technology, engineering and mathematics in an interdisciplinary and applied approach (Bybee, 2013). The A-level graduate is expected to use science and mathematics in life-long learning and to be innovative and to meet the ever-changing demands of technology. In this research the above definition is adopted.

1.7 Limitations of the study

The use of questionnaires as research instruments has inherent limitations. These include low return rate, deliberate misinformation, scepticism with regard to confidentiality of the information volunteered by respondents - hence withholding of information, lack of clarity of some of the questions, etc. An attempt was made to minimize the influence of these limitations on the study outcomes. The researcher distributed slightly more questionnaires to ensure that the number returned would be large enough to represent a validity sample size. Where possible, the questionnaires were completed while the researcher waited instead of
leaving them with respondents. Confidentiality was assured by including, in the preamble of the questionnaire, a statement to the effect that data would be used only for academic purposes and that anonymity of respondents was guaranteed.

Scepticism expressed by government officials such as heads of schools and regional office personnel with regards to the purpose of the data collection was allayed by presenting stamped authorisation letters from the university as well as from the Ministry of Primary and Secondary Education head office. Furthermore a commitment to submit a copy of the dissertation to the head office of the Ministry of Primary and Secondary Education was made.

Finances were also a major challenge to the research. Funds were required for transport around the schools as well as for phone bills. Stationery to produce questionnaires was also needed. The convenience sampling method was employed to cut on these costs.

1.8 Assumptions
The assumptions of the study included the following:
1.8.1 All Advanced Level schools have a current official national syllabus
1.8.2 All the Advanced Level teachers are qualified to teach Geography.
1.8.3 All Advanced Level students have obtained grade C or better in Geography at Ordinary Level.
1.8.4 There is no gender bias in the enrolment of Advanced Level students and the recruitment of Advanced Level Geography teachers.

1.9 Ethical issues
Authority to use selected urban schools as a source of data was obtained from the Permanent Secretary in the Ministry of Primary and Secondary Education (Appendix 1) as well as from Bindura University of Science Education (Appendix 2). The Provincial Education Director (PED) and the Geography Education Officer (EO) for Manicaland granted the permission to use the Mutare urban schools (Appendix 1). Permission was also sought from the Heads of the concerned schools to get information from both the staff and students. During data collection, it was emphasised that the information should be given voluntarily – without feeling coerced or threatened. If a respondent felt like withdrawing at any point during the course of the research, they were free to do so without prejudice. Confidentiality and
anonymity of informants was guaranteed. The contents of the research are not fabricated or falsified, neither are they plagiarised.

1.10 Delimitations
The research area was Mutare urban, targeting A-level schools and focusing on the Advanced Level ZIMSEC curriculum. Advanced Level teachers and students at three formal schools out of a total of nine Advanced level schools in the study area were sampled. The schools included in the sample were Dangamvura High School, Sakubva High School and Mutare Boys High School. Information was also gathered from geography lecturers at Mutare Teachers’ College and Africa University. The findings of the research are applicable to A-level schools in Mutare.
1.11 Study area

Fig 1.1: Study area showing Mutare Urban Schools with A-Level.

Key
1 Nyamauru Secondary School  2 Dangamvura High School
3 Sakubva 1 High School   4 Sakubva 2 High School
5 Elise Gledhill High School  6 Mutare Girls High
7 St Dominics High School  8 Mutare Boys High School
9 St Josephs High School

1.12 Conclusion

In this chapter an attempt was made to define the research problem and to give an over view of the main focus of the study. The study was prompted by the observation that there seemed to be knowledge and skills gaps in the Geography Advanced Level graduates leaving the high schools. The research aim, research questions, definition of terms, delimitations, assumptions, limitations and ethical issues were outlined.
CHAPTER 2
LITERATURE REVIEW

2.0 Introduction
This chapter looks at what other scholars have written on the occurrence, causes and possible strategies of overcoming the knowledge and skills gaps. An attempt has been made in this chapter to relate the findings of other researchers to what is obtaining in Zimbabwe. While there has been evidence of skills and knowledge gaps in Geography graduates in Brazil (Bruns et al., 2011), Kenya (Muita, 2012), India (Alam, 2009), Nigeria (Jegede & Ayeni, 2013 and Ezeudu, 2014) and Australia (NCCA, 2010), no study has been carried out in Zimbabwe hence this research.

2.1 Occurrence of Knowledge and skills gaps
Knowledge gaps in education have been noted at various levels of the educational ladder in both More Economically Developed Countries (MEDCs) and Less Economically Developed Countries (LEDCs). Heidegger quoted in Nijhof and Bandsma (2013) noted that the education system of the Federal Republic of Germany concentrates at achieving qualification requirements while missing the important goal of education which is the self-development of the individual into an independent personality. This was also supported by Biddulph et al., (2015) when they said that a framed curriculum with measurable objectives produces a product whose knowledge and skills are restricted in passing examinations. The teachers focus on smaller details at the expense of the broader concepts. Easy sections of the syllabus are taught leaving out complicated topics. For an education system to be effective it needs to equip its products with lifelong skills. In the studies carried out in the United Kingdom, pre-university students were noted with enormous gaps in both knowledge and skills. Tate and Swords (2012) explained these gaps in relation to field mapping, Global Information Systems (GIS), and in recording accurate weather data. In the studies, the students themselves expressed awareness of the existence of these gaps and lamented the absence of skills training in the education system. The gaps were observed both in practical
skills as well as in cognitive and critical-thinking skills. Students described themselves as descriptive learners without evaluative, critical and argumentative skills hence they find themselves unprepared for the change in approach at university (Tate & Swords, 2012). Skills gaps were also noted in the following areas, writing, organizing, understanding, fieldwork, laboratory techniques and numerical competencies (Mathion & Woodward, 2013). They also noted low skills in research and ICTs. The extent to which these gaps exist in the Zimbabwean situation has not been evaluated.

In the LEDCs gaps were noted in the teaching of map work in the Kogi state in Nigeria. The importance of maps in Geography can never be overemphasized and even though maps are not the whole of geography, there cannot be any geography without maps (Sarah, 2001 cited in Ezeudu, 2014). According to Sarah, the knowledge, skills and competences acquired in map education are also a solid base in the acquisition of knowledge in other aspects of senior secondary geography. Furthermore, maps are important for understanding spatial relationships as well as modern navigational technologies such as Global Positioning Satellite (GPS) and Geographical Information Systems (GIS). In the studies carried out in Kogi State in Nigeria, Ezeudu, (2014) observed that students were not competent in the use of maps and this led to the poor grades in geography in the region. The poor grades were also traced back to the incompetency and non-qualification of the geography teachers in map skills, among other causes. In the Zimbabwean A-level syllabus, map work is also an important component. The competencies of Zimbabwean A-level graduates in map work need to be evaluated.

In Brazil, studies have also revealed that most teachers are unable to use the available learning materials and this has resulted in low motivation and poor performance among the students (Bruns et al., 2011). The curriculum was also observed to be overloaded and oriented towards memorization resulting in negation of life-long learning in the students. The knowledge and skills gaps in Brazil are therefore manifested in the failure of students in attaining good grades in both primary and secondary education especially among the low-income rural families (Bruns et al., 2011) This is different to observations alluded to in the background to the study where students are passing the Zimsec examinations in spite of the noted knowledge and skills gaps at tertiary level.

2.2 Causes of knowledge and skills gaps
Some studies in Kenya (Muita, 2012), Canada (NCCA, 2010), Nigeria (Jegede & Ayeni, 2013 and Ezeudu, 2014) and India (Alam, 2009) have shown that knowledge and skills gaps are a result of a multiplicity of factors which include resource constrains, teacher attitudes and competency, the school factor as well as the syllabus structure and content.

2.2.1 Resources

Studies carried out in Kenya produced evidence of a strong correlation between syllabus coverage and student performance at secondary level (Amadale et al., 2012). The issue of resources versus syllabus coverage was also cited as a cause of poor performance. The fact that as many as six students had to share one textbook in some schools in Kenya made the completion of homework an uphill task if not an impossibility (Amadale et al., 2012). In such a scenario, follow up teaching is not based on students’ homework experiences and as a result the pace at which the syllabus will be covered will be very slow leading to poor performance. The availability of textbooks may however, result in over reliance on textbooks.

The over reliance on textbooks results in didactic teaching and also leads to undemanding and repetitive learning tasks being given to the pupils (NCCA, 2005). Such methods have little impact on the development of higher-order thinking skills and on nurturing pupils’ creativity. The influence of parents’ expectations on completing reading textbooks they buy for their pupils also has a negative impact. Teachers tend to aim to complete the book at the expense of developing relevant skills and knowledge in the pupils.

Another aspect is the way the textbooks are written. This has also contributed to the pedagogical tension. Writers include chapters on all possible topics so as to improve a textbook’s chances of adoption thus creating an “encyclopaedic curriculum” (Schwartz, 2008). This has resulted in textbooks that fail to achieve meaningful levels of in-depth understanding. In the current study resources and syllabus coverage are going to be evaluated as possible causes of knowledge and skills gaps.

2.2.2 Teachers factors

The system of pedagogy used by teachers has also contributed to knowledge and skills gaps in India (Alam, 2009). The teaching styles used in India have promoted rote learning. The teachers in India have also used books as syllabuses. Very little emphasis has been put on
fieldwork in India because of financial constraints. Very few Indian schools have resources to conduct field work even to nearby surrounding places. The geography books in India are overloaded with facts of which students are expected to memorise. Also, the teaching and learning media is very expensive and many of the schools cannot afford buying them. This scenario has also created knowledge and skills gaps in India.

The lack of training of teachers in fieldwork has also contributed to knowledge and skills gaps amongst A-level graduates. Teachers who were exposed to field work during their training are more comfortable with the method than their counter parts without such an exposure (Jegede and Ayeni, 2013). Field work methodology is a skill which teachers acquire during their professional development. The organization of fieldwork requires an integrative approach in order to motivate pupils (Kwan, 2013). In the integrative approach, various aspects of the syllabus are included. An example would be when carrying out slope investigations, related tasks like vegetation studies, ecology, hydrology and human activities can also be studied. This approach saves on costs and reduces redundancy.

Limited access to the national syllabus by students can also contribute to knowledge and skills gaps. According to Watkins (2012), a syllabus document gives the yardsticks of what is to be taught and how it is taught. The availability of the document to students enables them to come to terms with the expectations of the contract between them and the examination board. In the current study teacher factors are going to be evaluated as possible causes of knowledge and skills gaps.

2.2.3 Curriculum overload

In the research carried out by the National Council for the Curriculum and Assessment (NCCA, 2010), time was identified as the greatest challenge in implementing the curriculum. The time issue is in two dimensions. The first dimension relates to the size and scale of the curriculum while the second relates to the challenge of meeting children’s individual needs in the multi-grade and large classes. In this study teachers made the report that they had insufficient time to fully implement curriculum subjects or address all of the objectives within each of the subjects. The teachers complained of the difficulties of planning so much in so short a time frame (NCCA, 2010). The teachers also lamented that they had insufficient time to meet all the needs of all the learners. Some teachers felt overwhelmed by both the volume of the documentation and the perceived pressure of
external expectations. In other words teachers fail to complete the stipulated curriculum due to lack of time. This leads to the teachers selecting certain topics and teaching only these with great depth. Students will pass the public examinations but with some knowledge and skill gaps. Similar findings were also made in England. In the Cambridge primary review enquiry, what was expected to be a broad, balanced and rich curriculum was described by many teachers as overcrowded and unmanageable (Cambridge Primary Review, 2009 cited in NCCA, 2010).

The review also identified lack of space for reflective and interactive classroom pedagogy as a cause of the gaps. These views were also supported by the findings made by Australian Primary Principals Association (APPA) which noted that, “teachers believe there is simply too much to teach within the available instructional time” (APPA, 2008 cited in NCCA, 2010:7). In the Philippines an overcrowded curriculum was blamed for low levels of achievement among students and delays in the development of critical competences. The research also showed that the coverage of an extensive subject matter tended to take priority over in-depth learning, given the relatively little time provided for implementing the curriculum (UNESCO, 2003 cited in NCCA, 2010). Large classes also contributed to creation knowledge and skills gaps because they affected curriculum implementation (Muita, 2012).

The issue of lack of time to complete the curriculum objectives were also cited in Ontario. In the Canadian press (2009) the education minister Wayne, commenting on complaints by the teachers quoted a teacher as saying, “...... I felt like I was rushing the children through the curriculum, just to get through everything. I would have liked to have taught things in more depth” (NCCA, 2010:24). The teacher also further described the curriculum as being a mile wide and an inch deep. Such sentiments help to substantiate the idea that the curriculum is longer than can be achieved in the stipulated time. Primary school teachers in New Zealand also expressed the same sentiments. Elsewhere in China and the Philippines the curriculum content was described as overloaded making it difficult for pupils to complete it (APPA, 2008 cited in NCCA, 2010). The overcrowded curriculum also hinders or delays the development of critical competences amongst the students. In Vietnam a lot of content is said to be heavy on theory but lacks applicable knowledge (APPA, 2008 cited in NCCA, 2010). Studies in Kenya also indicated that time was not enough to cover the breadth and length of the geography A-level curriculum (Muita, 2012). It is the onus of this research
to find out how time allocated to the A-level Geography curriculum has caused knowledge and skills gaps.

2.2.4 Ranking of schools
The implementation of the curriculum has been seriously affected by the need to pass the national examinations (Amunga et al., 2010). This has been further aggravated by the so-called ranking of schools according to examination pass rates. This has led to teachers concentrating their teaching on teaching possible examinations topics at the expense of a wide range of topics, skills and competences (Kurebwa, 2012). The problem of examinations has deprived teachers the freedom to explore the curriculum fully thereby negatively affecting its implementation. The teachers’ perception of assessment is important in determining their view of teaching, learning and curricula (Kurebwa, 2012). Good results represent school effectiveness and so teachers teach for the examinations as a means of proving their effectiveness while leaving out valuable knowledge and skills which are needed in the life of the students after high school. This study seeks to evaluate the impact of the ranking of schools on the creation of knowledge and skills gaps in A-level geography students.

2.3 Strategies of overcoming knowledge and skills gaps
Solving the knowledge and skills gaps is very similar to solving a puzzle (Freifield, 2013). While it is very important to have the entire necessary pieces, it is equally important to ensure that all these pieces fit. Several intervention strategies to overcome knowledge and skills gaps have been put forward by a number of writers such as, Muita, 2012 (Kenya), Alam, 2009 (India), Jegede & Ayeni, 2013 and Ezeudu, 2014 (Nigeria) and NCCA, 2010 (Australia) listed below. These strategies include the following, synergies and collaboration amongst stakeholders, innovations in pedagogy and STEM methodologies. In addition to these strategies, curriculum review and teacher development were also propounded.

2.3.1 Synergies and Collaboration amongst stakeholders
The knowledge and skills gaps in the students can be reduced by promoting collaboration amongst, school teachers, college and university lecturers, geographical societies, researchers and students (Alam, 2009). Synergies can also be developed by teaching geography topics alongside other disciplines such as earth sciences and environmental science (Alam,
The parents and community involvement can also be in the form of funding to enable provision of adequate physical facilities. They should also ensure that laboratories and libraries are up to date and well equipped. Funding is also necessary to develop teaching and learning that is ICT (Information and Communication Technologies) driven (Sodipo, 2014). This study will examine how synergies and collaboration may reduce knowledge and skills gaps in A-level geography students.

2.3.2 Innovations in Pedagogy
A lot of literature across the globe has suggested several intervention strategies to address the knowledge and skills gaps (Kennewell, 2004), (Alam, 2009), (Yaunie, 2012 cited in Leask, 2012), (Savery, 2006), (Kumtepe & Kumtepe, 2015), (Omoro & Nato, 2014), and (Sodipo, 2014). Traditional teaching and learning strategies have failed in making inroads in the closure of the knowledge and skills gaps in A-level graduates. Some of the suggested intervention strategies include the use of ICTs, STEM educational methodologies, curriculum review and teacher development. Some suggestions are that teachers ought to be developed in twenty first century methodologies.

2.3.2.1 Information Communication Technology (ICT)
The use ICTs in the teaching of geography has several advantages (Kennewell, 2004). ICTs promote geographical enquiry skills. It improves skills of graphicacy, statistical and spatial analysis as well as developing an understanding of geographical patterns, processes and relationships. Another advantage is in that ICTs save time as compared to traditional methods. A good example of this advantage is demonstrated in the use of ICTs in the field as well as in the classroom. When measuring the depth and velocity of a stream and size of bed load, data can be entered on the sport into a pre-prepared spread sheet on laptop. The results can be processed using Microsoft excel in the form of tables and graphs. The processed data is more accurate than the one produced by traditional methods. The other computer resources used in the teaching include Microsoft word and PowerPoint, Skype, Google maps, Internet, whatsapp and Face book. Modern technologies are also important in teaching spatial competencies in geography (Alam, 2009). These help in understanding spatial issues at local, regional, national and global levels such as Geographical Information Systems (GIS) and Remote Sensing (RS). However, Yaunie, (2012) cited in Leask (2012) identified the following challenges of using ICTs. Competencies in ICTs are limited in some schools. The ICT gadgets are very expensive and out of reach to many schools. Another
challenge is the connectivity to the internet. Some areas are not connected and the connectivity is also very expensive. Development of software suitable for pedagogical needs is a tall order for many schools. The benefits however outweigh the disadvantages. In this study, the use of ICTs in reducing knowledge and skills gaps in A-level Geography students is evaluated.

2.3.2.2 STEM methodology
Use of stem methodologies is one way of promoting effective teaching. Stem education promotes an integrated curriculum whereby students become innovative problem solvers, researchers, engineers, and designers (Kumtepe & Kumtepe, 2015). Some of the popular stem methodologies include, problem-based learning, case-based learning, project-based learning and enquiry- based learning (Savery, 2006).

**Problem-based learning (PBL)**
This is a “learner-centred approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem” (Savery, 2006:2). Savery (2006) goes on to list some of the following characteristics of PBL. The method employs free enquiry from the learners. It also integrates many disciplines and promotes collaboration of learners. Learning is self directed and activities are linked to those valued in the real world. Assessment is based on the goals of PBL of which are both knowledge and process-based. The tutor is a facilitator.PBL can help facilitate the acquisition of knowledge and relevant skills. However, Savery (2006) cited a number of challenges related to PBL. Where the curriculum is state mandated the expectation is to produce a uniform product and PBL becomes difficult to apply because of its strong learner –centeredness. Individual differences are not well catered for. Also where classes are too big, application of PBL is difficult.

**Case-based learning (CBL)**
This method describes a teaching approach that promotes higher order thinking such as analysis and synthesis (Savery, 2006). When done in groups, learners may develop improved communication and collaboration skills. It is also a learner -centred approach. Such an approach may be effective in the acquisition of knowledge and relevant skills. The limitations cited for PBL also apply to CBL.
**Project – based learning (PBL)**
This is an approach, where learning activities are organized around achieving a shared goal (Savery, 2006). The learning process is more oriented to following correct procedures. The teachers play the role of instructor and coach whereby they guide the learner to the desired goal. The approach is also learner –centred. Such an approach can be effective in the teaching of A-level geography field work. Learners in this approach are given specific tasks and allowed to follow guidelines in order to meet a specific goal. The limitations cited for PBL also apply to project based learning.

**In inquiry -based learning (IBL)**
In this approach activities begin with a question followed by investigating solutions, creating new knowledge as information is gathered and understood (Savery, 2006). The approach is also learner –centred. Such an approach can also be effective in the teaching of fieldwork at A-level. The limitations cited for PBL also apply to inquiry based learning. The use of stem methodologies in reducing knowledge and skills gaps is examined in this study.

**2.3.2.3 General lesson presentation**
Lesson presentation should not only focus on the acquisition of knowledge by students but also should give students relevant practical skills( Sodipo, 2014). The use of demonstration as a teaching method especially in the acquisition of appropriate skills is also very useful in bridging the skills gaps. The acquisition of knowledge is possible through oral instruction like explanation while acquisition of skills can be through demonstration (Omoro & Nato, 2014). Lesson presentation therefore should not only focus on acquisition of knowledge by students but should also give students relevant practical skills (Sodipo, 2014).

**2.3.3 Curriculum review**
Alam (2009) came up with several strategies to review the curriculum. One such strategy is to involve the teachers in curriculum development .This enhances buy in by the teachers. The other strategy is to review the content of the geography syllabus. Geography content is always changing hence the need to review it time and again. Human and physical geography should also be integrated .Use of field work is also critical in the teaching of geography (Ondigi, 2012).
The use of experimentation is also valuable in imparting concrete ideas to students when explaining abstract concepts (Salim Basha, 2004). Also geography should be taught alongside earth sciences such as geology and science (Alam, 2009). The use of STEM education methodology is also a needed input in education (Bybee, 2013). STEM is an interdisciplinary approach to learning which integrates academic concepts with real world lessons. In STEM students are developed such that they use science, technology engineering and mathematics to integrate school with community, work and the global enterprise (Bybee, 2013). The research will explore the importance of curriculum review in reducing knowledge and skills gaps in geography students.

2.3.4 Teacher Development

The main aim of teacher development is to produce a good teacher. A good teacher is one who has high level of competences, commitment and emotional attachment to pupils (Morgan and Lambert, 2005). It is therefore necessary to carry out in-service training and workshops on the use of the appropriate pedagogy for each of the curriculum objectives (Biddulph et al., 2015). There is also a need to equip the teachers on STEM methodology which when used can go a long way in solving the knowledge and skills gaps in the students (Bybee, 2013). The attributes of STEM education include the ability to develop critical thinking skills in the learners. STEM also achieves lifelong learning. An added attribute of STEM is the development in the learners, competences in representation as well as interdisciplinary thinking. Learners are also equipped with entrepreneurship and systems thinking skills (Sahin, 2015). Policies must also be developed that are aimed at raising teacher quality by providing targeted education so as to enable teachers to receive the skills and knowledge they need for working in the schools (Bruns et al., 2011). Mentoring for novice teachers should also be provided in order to aid the development of appropriate teaching skills. There is also need to develop adequate financial and career incentives to attract and retain quality teachers in the high schools. Such motivation will result in teachers striving to ensure that students are learning effectively (Sodipo, 2014). In this study, the contribution of teachers in reducing knowledge and skills gaps in geography students is also examined.

The use the integrative approach in teaching can also help in reducing content and skills gaps. In this approach related concepts are taught together so as to make learners perceive knowledge as an integrated whole (Bamusiime, 2010).
2.4 Summary

The chapter has looked at other studies done on knowledge and skills gaps. Some of the causes cited by these studies include the following, resources, teacher factors, curriculum overload, and ranking of schools. The researchers also looked at some intervention strategies such as, synergies and collaboration between stakeholders, use of stem methodology and teacher development. Most of these works are foreign and are not focused on A-level geography. This leaves a gap which this research sought to fill.
CHAPTER 3
RESEARCH METHODOLOGY

3.0 Introduction
This chapter presents the research design, the target population, the sample, the research instruments, data collection and analyses procedures that were chosen as the most suitable for addressing the formulated research questions. The methods used to maintain validity and reliability of the instruments are also described. The chapter ends with a summary.

3.1 Research Design
The research followed a qualitative approach. The qualitative produces data in prose or textual form (Garborino & Holland, 2009). The data collected in this research was descriptive in its nature and this called for qualitative methods of data collection. The qualitative methods of data collection used in this research were, observations, in-depth individual interviews, focus group interviews, free elicitation, and content analysis.

The descriptive research design was employed in this research. The descriptive survey usually deals with relevant but non quantified data involving a well-focused research problem (Monsen & Van Hon, 2007). In this research, the questions used in the interviews were flexible, thus making the design applicable (Mitchell & Jolley, 2012). The respondents were allowed the freedom to express their views without having to fit into specified criteria. The descriptive survey also describes behaviour more accurately than other designs. This research involved the study of attitudes of teachers and students towards acquisition of relevant knowledge and skills. Teachers and students are both human beings whose behaviour is influenced by social, economic, biophysical and political environments hence, justifying the use of the descriptive survey.

Another justification of the descriptive survey was in its use of case studies (Monsen & Van Hon, 2007). In the study, three schools namely, Dangamvura high, Sakubva 1 and Mutare
Boys high schools were used as case studies. One of the advantages of using the case study was that, it enabled the researcher to study the specific events, activities, settings and phenomena in the above mentioned schools (Edwards & Skinner, 2009). Some of the activities carried out in the schools included observing live lessons and inspecting both written work by pupils and schemes of work. The settings of the schools included their social, political, economic and biophysical environments. Phenomena looked at issues such as the curriculum, time table and both pupil and teacher attitudes. All these made the case study more relevant as a descriptive survey.

However, the descriptive research design has its own limitations. One of the disadvantages is that it fails to give causes and effect relationships between variables (Mitchell and Jolley, 2012). In this study, the relationship between specific factors such as school, teacher, syllabus and pupils and the acquisition of relevant knowledge and skills is not correlated. The correlation of these variables remains a gap for further research. Another limitation is that descriptive research cannot control variables but simply narrates what is happening (Kothari, 2004). In this study, variables like the school, pupils, syllabus and teachers were not under control by the researcher.

3.2 Research Methods and Techniques
The study used a variety of methods of data collection and these included direct observations, questionnaires, interviews and document analysis. Two different questionnaires were administered to teachers and students. Two types of interviews were conducted and these were one on one and focus groups. Focus group interviews were held for teachers, lecturers in tertiary institutions and students. Direct observations were mainly by observing some live lessons conducted by the teachers. Document analysis was by studying schemes of work produced by the teachers and written work by the students.

3.2.1 Interviews
A variety of interviews such as informal, topic-focused, semi-structured or open-ended interviews as well as group interviews were used to collect data for the three research questions. Informal interviews aim to elicit information via conversations between an interviewer and a respondent (Eadie, 2009). Informal interviews in this research were held with some of the education inspectors in the ministry of education, some of the Advanced Level geography teachers as well as college lecturers. The other respondents were
interviewed through topic- oriented interviews. These made use of interview guides to direct the interviewer through the main topics which were covered.

3.2.1 Focus groups

Focus group interviews with some of the Advanced Level students, teachers and lectures were carried out. One of the advantages of using the focus group interviews was that, the researcher had an opportunity of accessing the various communication forms such as jokes, teasing and arguing from the students and teachers (Liamputtong, 2011). Also in the focus groups the researcher had the advantage of adjusting questions with the groups to meet the changing demands of the interviews (Liamputtong, 2011). The focus groups were also engaged because they facilitated collective power from the marginalised students who would have found it difficult to divulge information in a one on one interview setting (Parasuraman, 2007). A copy of some interview questions is attached in the appendix 3.

3.2.1.2 One on One Interview

The heads of Geography departments in the schools are also important informants as they play a pivotal role of managing activities in the teaching and learning of Geography. One on one interviews were held with these offices. The interview questions touched on the following, syllabus coverage by teachers, teaching methods, skills development in practical Geography and quality of written work. The one on one interviews were carried with persons in high offices who possess broad information in Geography. Their participation is effective in private arrangements than in groups. A copy of some one on one interview questions is attached in appendix 4.

3.2.2 Questionnaires

The research also made use of the questionnaire as a data collection tool for the three research questions. According to Rose and Grosvenor (2013) questionnaires can be completed in one of two basic ways that is the postal questionnaire or in the presence of the researcher. For this research the questionnaires were hand delivered. They can also be either structured or open ended. In this research a mixture of both open ended and structured questionnaires were made use of. The questionnaires were used because of a number of
advantages. Questionnaires are popular and fundamental tools for acquiring information on public knowledge (Bird, 2009). In this study, public knowledge was on the following issues, school, teachers, syllabus and other curriculum components. Questionnaires were also used because of their low cost. They were cheap to administer, the only costs incurred were of printing or designing the questionnaires, their postage and/or electronic distribution. The questionnaires enabled the researcher to cover the sampled schools in a reasonable short time than face-to-face interviews. Where self completed questionnaire are used it reduces biasing error (Phellas, 2011). Furthermore, the absence of the researcher provides greater anonymity for the respondents and this increases reliability especially when topic is sensitive.

The major setback of this technique is the absence of control on who fills out the questionnaire. There is also no opportunity to probe or clarifying any misunderstanding. To minimize these in this study, the questionnaires were filled in while waiting and collected them there and then. Two sets of questionnaires were constructed, one for the students and the other for the teachers. These were short and were filled in while the researcher waited.

3.2.2.1 Questionnaire for students
In this study, the students were given questionnaires as they constituted an important group of participants. Students are also big clients in the school system. The students are the ones who should acquire the relevant skills and knowledge. The questionnaires had both open ended and closed questions. The questionnaires looked at topic coverage by teachers, accessibility of the A-level syllabus and skills development in practical Geography. The details of the questionnaire are shown in appendix 5.

3.2.2.2 Questionnaire for teachers
Teachers on the other hand are also important research participants as they facilitate the acquisition of relevant knowledge and skills by students. The questionnaires also had both open ended and closed questions. The questionnaires also looked at topic coverage by teachers, methods of teaching, skills development in practical Geography and use of ICTs. The details of the questionnaire are shown in appendix 6.

3.2.3 Direct observations
Direct observation is defined as a way of gathering data through watching behaviour or events in their natural setting (Jamison, 2006). In this research the observations were largely overt during lesson observations. On the other hand observations can be covert, whereby the people are being observed while they are not aware. These have the advantage that people in covert are likely to behave more naturally than those who are aware of being under observation. This is referred to as the Hawthorne effect (Jamison, 2006). Another disadvantage is that of observer bias. In this research such disadvantages are minimized by the use of other data sources such as interviews and document analysis. Observations were made by observing some A-level lessons in progress using the observation sheet. The observations carried out were done to collect data for research questions 1 and 2. The observations were carried out with the help of an observation sheet. The observation sheet was made up of some guidelines which focussed on items to be observed as shown in appendix 7. The guidelines of the observation sheet covered the following areas, use of stem methodology, topic coverage, use of ICTs and skills coverage.

3.2.4 Document Analysis

A document is defined as a written text (Magalakwe, 2006). Documents may include minutes of meetings, board resolutions, advertisements, invoices and personal records. For the purpose of triangulation document analysis was used through studying the A-level national geography syllabus (ZIMSEC 9156) and school syllabi for the sampled schools. The schemes of work of the A-level teachers and written work by pupils were also used. The documents helped in checking information given through interviews and questionnaires.

3.2.4.1 The national syllabus and the school syllabus

The aims and objectives of the school syllabus were compared with those of the national syllabus. The following pedagogical aspects were analysed topic coverage, integration and sequencing.

3.2.4.2 Schemes of work

Compliance of the scheme aims and objectives to those of the national syllabus was looked at. The following aspects were also checked, topic coverage, practical skills in Geography, methodology with special emphasis on STEM and the use of ICTs. The frequency of practical Geography was also checked on.
3.2.4.3 Written Work
Written work by pupils gives a lot of information about the teaching and learning processes. The following aspects were checked on in the written work given to pupils, quality and frequency of practical work, the number of exercises given in structural landforms, slopes, climatology, and settlement studies.

3.3 Population and Sampling
The study area has a population of nine A-level schools derived from Dangamvura, Sakubva and Town suburbs residential areas. A sample of one school was taken from each residential school.

3.3.1 Population
A population refers to the totality of all subjects possessing a set of specifications, constituting the entire group of persons that is of interest to the researcher and to whom the research results can be generalised (Wallace and Van Fleet, 2012). The study area has a population of nine A-level schools namely, Dangamvura High school, Nyamauru Secondary School, Sakubva 1 and 2, Mutare Girls High, St. Dominic’s, Ellis Gledhill, St Josephs and Mutare Boys High. The total population of geography students for the schools is 360. The total population of A-level geography teachers for the schools is 9. The population of tertiary institutions which absorb A-level geography graduates in Manicaland are 2, namely Mutare Teachers’ and Africa University. The population of geography lecturers for the institutions adds up to 9.

3.3.2 Sampling
The study drew its samples from the schools, teachers, lecturers and students.

3.3.2.1 Schools
The area of study consists of three distinct geographical areas namely, Dangamvura, Sakubva and town suburbs. A sample of three schools was used and this represented 30% of the population of schools. In order to represent each geographical area stratified sampling was used. Table 3.1 shows the schools and their geographical locations. These geographical locations possess different characteristics such as the economic status of the students.
Evidence of these differences is in the quality of housing in the three locations. While the population density of Sakubva residential location is the highest, Dangamvura has a lower density and the town area has the lowest population density. The sizes of the stands also vary among the regions with houses in Sakubva occupying very small areas. If the distinctions among the residential areas is anything to go by it means the economic statuses of the regions also vary, hence the sample is fairly representative of the geographical area under study.

<table>
<thead>
<tr>
<th></th>
<th>Sakubva 1</th>
<th>Dangamvura</th>
<th>Town Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sakubva</td>
<td>Dangamvura</td>
<td>Mutare Boys high</td>
<td></td>
</tr>
<tr>
<td>Sakubva2</td>
<td>Nyamauru</td>
<td>Mutare Girls High</td>
<td></td>
</tr>
<tr>
<td>Ellis Gledhill</td>
<td></td>
<td>St Dominic</td>
<td></td>
</tr>
<tr>
<td>St Joseph’s</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3.1: Distribution of schools in Mutare urban**

Random sampling was then used to determine the choice of school for Sakubva and town suburbs. The schools were allocated some numbers and the papers were put in hat. The papers were shuffled by shaking the hat. The top paper was then picked and Sakubva 1 and Mutare Boys High were picked to represent Sakubva and town suburbs respectively. For Dangamvura, Dangamvura High school was selected using convenience sampling as it is the work place of the researcher in order to cut on costs.

**3.3.2.2 Students**

From a population of 360 students, 108 students were sampled and this represented 30% of the population. These students were given questionnaires and the return rate was above 95%. Table 3.2 shows the distribution of the sampled students amongst the three schools.

<table>
<thead>
<tr>
<th>School</th>
<th>Number of students sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dangamvura</td>
<td>18</td>
</tr>
<tr>
<td>Sakubva 1</td>
<td>60</td>
</tr>
</tbody>
</table>
Table 3.2: Number of students sampled. Source: Field Data

Focus group interviews were also conducted. One session per school was conducted and these lasted for an hour.

3.3.2.3 Teachers and lectures
A total of 6 A-Level teachers were sampled from a population. Two teachers were therefore sampled from each school and this represents 67% of the population. Two lectures from Mutare Teachers’ College and two from Africa University were also sampled. Their sampling was based on availability.

Each of the six teachers was given a questionnaire and the return rate was 100%. Focus group interviews were also held in each of the schools with members in the geography subject area. Two other sessions were held for Mutare Teachers’ College and Africa University. These two represented the tertiary institutions involved in the production of teachers who might be coming to schools with knowledge and skills gaps. The Manicaland geography subject inspector was also interviewed since the office plays an important role in supervising of geography teachers. One-on-one interviews were also conducted with the heads of subject for the three sampled schools. The geography head of subject is the subject manager at school level and is a vital source of information.

One geography lesson was observed for each of the sampled schools. The schemes of work and written work were also analysed for the teachers whose lessons were observed. Five exercise books were sampled for each of the classes by taking the first five according to the alphabet.

3.4 Data Collection procedures and techniques
These refer to steps taken in administering instruments and collection of data. In this study the procedures were carried out for questionnaires, interviews and observations as detailed
in the next sub-sections. The questionnaires were administered at the end of second term of upper sixth so as to ensure completion of the syllabus by the teachers. The interviews and observations were also conducted in the same period for the same reason as mentioned above.

3.4.1 Procedure for Use of Questionnaires
The first step taken was the testing of questionnaires during the pre survey. After the pre survey the questionnaire was improved and the schools, teachers and students to be given questionnaires were identified. Two field officers were trained to administer the questionnaires. This was done in order to make the process clear and consistent. This was also done to maintain the validity and reliability of the data. After training the questionnaires were distributed by hand to the teachers and the students of the sampled schools. The questionnaires were completed in the presence of the field officers and were collected the same day. This was done to ensure a high return rate. For the teachers the return rate was 100% and for the students it was 95%. Field officers helped respondents in explaining items which were not clear. This increased the accuracy of the data.

3.4.2 Procedure for Conducting Interviews
Key informants were identified during the reconnaissance surveys. Appointments for both one on one and focus group interviews were made a week before the date. One on one interviews were done with heads of geography departments and focus group with teachers, students and lecturers. On the interview days, the field officers were punctual, as a way of reducing inconveniences to the teachers, students and lecturers. The interview questions were kept simple and brief as a way of promoting participation of the respondents. The data was captured in a booking sheet. The date and time were also recorded. In the focus group interviews the conveners avoided sensitive issues as a way of promoting every member to participate.

3.4.3 Protocol for Observations
Teachers were informed about the lesson observations a week before the lesson. This was to enable the teachers to be at their best performance. The teachers were told that no marks were awarded for the observations and no reports were going to be sent to the school heads or other authorities. This was done so as to create an environment conducive for the teachers to teach freely. Such an environment enabled a more accurate observation of the
teachers. The field officers did not interfere with the proceedings of the lesson. This was done to avoid influencing the performance of the teachers. The lesson observations were recorded on a booking sheet which recorded the time, date and comments. The data was also used to triangulate the data given by the questionnaires.

3.4.4 Procedures for document analysis
A request for the schemes of work and written work was made a week before the lesson observations. This was done to allow teachers to put things together so that the analysis would be more meaningful when all the relevant documents are there. The analysis was done on a booking sheet which recorded the time, date and comments.

3.5 Procedure for data analysis
Data collected from both questionnaires for students and teachers was categorised according to the themes given in the questionnaires. The responses for each question in the questionnaires were counted and a percentage was calculated. The themes and percentage scores were presented in tables, bar graphs and pie charts. The tables, bar graphs and pie charts were used to show trends and patterns in the existence of knowledge and skills gaps in post A-Level graduates, and the respective causes and intervention strategies. Data from the interviews was also categorised using themes from the participants. Data from the observations was also coded using themes given in the observation sheet. Both data from interviews and observations was also used to triangulate the data given by the questionnaires. Document analysis was also employed by checking methods in the schemes of work against the methods used by the teachers in the observed lessons.

3.6 Summary of Chapter
The chapter made an identification of research design and outlined the advantages and disadvantages of using the design. A description and explanation of how the sample was selected as well as data collection procedures is also made. Measures taken to ensure validity and reliability of the research findings were also explained in the chapter. Procedures for data analysis were also outlined.
CHAPTER 4

PRESENTATION OF FINDINGS AND DISCUSSION

4.0 Introduction
This chapter looks at the presentation of the data with the help of graphs as well as tables. The data is also analysed and interpreted. The data from these were then explained and linked to the research questions. The chapter begins by analysing the demographic characteristics of the respondents in which the gender and age of the teachers and students are described. The demographic data also looks at the teaching experience of the teachers in the sampled A-Level schools. This information may have an important bearing on the research findings. The knowledge gaps are also identified described and explained by means of finding out the areas of the syllabus the teachers and students are not addressing. Gaps in skills are also identified and described for both physical and human geography. The chapter goes on further to look at how gaps are caused by teachers, students, the syllabus as well as the school factors. The role of each of these factors is discussed. Solutions to the skills and knowledge gaps are also suggested in this chapter. The suggested solutions include curriculum review, improvement in time management and changes in teaching approaches which include the adoption of STEM education methodology.

4.1 Demographic Characteristics of Respondents
The demographic characteristics of the respondents were critical in analysing and interpreting the data. The following demographic aspects were looked at, gender of respondents, both ages of students and teachers, academic qualifications and experience of teachers.

4.1.1 Gender of Respondents
From the sample of A-level students taken in Mutare urban, 33% were female and 67% were male. The figures are reflective of the structure of the A-level students in Mutare urban
schools. At Dangamvura High school, for example, out of a total of 18 students only four are girls. There is therefore a clear gender imbalance among the A-level geography students in Mutare.

4.1.2 Age of students
In the sampled schools eighty percent of the students were between 18 and 19 years of age while twenty percent were between 16 and 17 years of age. For 16-17 and the 18-19 age group the sex structure was 7% and 27% respectively for the female student. The age of the students however has no bearing on the acquisition of knowledge and skills. The gaps in knowledge and skills are therefore a function of other variables.

4.1.3 Age of Teachers
From the sample of teachers taken from Mutare urban the teachers ages ranged from 26-30 years and 41-50 years of age, and of these there were 29% and 71% respectively. In the sample 57% were male and 43% female. The age of the teachers shows that most of the teachers are mature enough to handle the A-Level curriculum. Teachers are also still active and capable of facilitating acquisition of relevant content and skills. These results show that the gaps in A-Level graduates cannot be attributed to the age of the teachers only but to other variables.

4.1.4 Teaching Experience
Information gathered from the questionnaires revealed that 9% of the teachers have teaching experience ranging from 3-7 years while 71% had 16-23 years of experience. In line with these findings it shows that the teachers are adequately experienced at teaching A-level hence dismissing lack of teaching experience as a cause for the knowledge and skills gaps in the graduates. These teachers have long experience and according to Clotfelter, Ladd and Vigdor (2007) experience makes good teachers.

4.1.5 Academic and professional qualifications
The questionnaires revealed that the Advanced Level teachers are qualified to teach at this Level. Academically, 29% of the teachers possess BA General Degrees and B.A Ed each while 42% hold BSc degrees (Fig. 4.1).
Fig. 4.1: Academic qualifications of teachers. Source: Field Data
For the professional qualification, 30% of the sampled teachers hold Graduate Certificate in Education (Grad.CE) while the remaining 70% hold a diploma in Institute of People Management of Zimbabwe – IPMZ (14%), Post Graduate Diploma in Education - PGDE
(14%), Certificate in Education – CE (14%), Diploma in Education - Dip ED (14%) and Bachelor of Arts Education - B.A Ed. (14%) (Fig. 4.2).

These findings confirm that the teachers are adequately qualified to teach Advanced Level geography. Surveys carried out from the focus group interviews showed that 70% of the teachers did not undergo carrier development by the employer. Lack of carrier development of geography teachers was cited in the focus group interviews as one of the responsible factors in creating knowledge and skills gaps. These findings are in agreement with studies
done in Kenya by Musau and Abere (2015) when they found out that, teacher qualifications did not significantly affect student performance but lack of carrier development.

4.2 Knowledge Gaps
The A-level teachers’ questionnaires revealed that out of the four core topics stipulated in the A-level geography curriculum, 42% of the teachers cover only 2 topics while 3 and 4 topics were covered by 29% of the teachers each (Fig. 4.3).

![Fig. 4.3: Percentage number of teachers who covered the topics. Source: Field Data](image)

This means that most teachers are leaving out certain topics which are supposed to be covered by the A-level students. This is further supported by questionnaires of students which show that 60% of the students were discouraged from studying climatology and 33% were discouraged from taking biogeography. Only 33% were not discouraged from taking any of the core topics. Data obtained from focus group interviews of the sampled tertiary institutions such as Mutare Teachers’ College and Africa University confirmed that A-level graduates had content gaps in physical geography topics such as climatology. From the data obtained from the questionnaires of the sampled schools, 43% of the teachers completely leave out climatology while 57% are leaving out biogeography. Document
analysis also concurs with these findings. The scheme books analysed had no evidence of having covered climatology and biogeography. Information from the interviews with the teachers and students showed that even for the popular topics certain sections were not adequately covered for example under geomorphology slope theories were left out. Under hydrology sections such as ground water, flood hydrographs and the Hjulstrom curve were not adequately covered.

Questionnaires of teachers and students also revealed similar knowledge gaps in the Human geography section of the syllabus. Out of the four human geography core topics stipulated in the syllabus, only 14% of the teachers cover all topics while 14% cover only 2 topics. The remaining 72% of the teachers cover three topics out of the four core topics. From the A-level teachers’ questionnaires 71% of the sampled schools completely leave out industries and 14% leave out settlement in section B. Students’ questionnaires and interviews also showed that 66% of the sampled schools cover 3 core topics out of the stipulated 4 while only 27% cover the 4 core topics. Seven percent of the sampled students cover only 2 out of the 4 core topics. For the optional topics in human geography 93% cover environmental management while 73% cover mining, fuel and power. Only 7% cover transport and trade. Economic development and planning is completely left out in all schools. Out of the stipulated topics in section C, 73% of the pupils cover the required 2 topics while 20% cover only 1 topic. Focus group interviews with the students for the schools also showed that settlement geography was also left out or incompletely covered by many teachers. A study of both geography syllabuses of Mutare Teachers and Zimsec showed that the optional topics at A-level were the key topics in the college syllabus (appendices 8&9 respectively). An example is that, for the A-level syllabus, structural landforms is an optional topic of which is a key topic for the college syllabus. This shows that the Zimsec syllabus is not meeting the expectations of Mutare Teachers College, a tertiary institution of higher learning.

4.3 Skills Gaps
Information from questionnaires and interviews revealed the existence of skills gaps in both human and physical geography. Out of at least nine skills stipulated in the syllabus only two are covered. A total of 86 % of the sampled teachers covered sketch maps and sketch sections only, while 14% cover sketch sections, sketch maps and fieldwork. From the teachers’ questionnaires 86% completely leave out fieldwork while 14% allocate 1-2 hours
per term for fieldwork as shown in table 4.1. Although 72% of the teachers are giving more than 5 hours per term to sketch maps, the written work by students showed that they lacked skills in landform demarcation using contour lines. Fifty eight percent of the teachers are allocating more than 5 hours per term for sketch sections. The two skills of drawing sketch maps and sketch sections are complimentary. A clear understanding of sketch sections helps in the description of landforms demarcated in the sketch maps.

Time allocated for fieldwork is seriously inadequate to successfully cover the stipulated content bearing in mind that there is need for travelling time to the site of the fieldwork activity. Interviews with both teachers and students also revealed that the fieldwork is covered theoretically, without going out into the field. Similarly, although 86% of the sampled students revealed that they covered questionnaires in human geography, evidence from focus group interviews showed that these were also covered theoretically without a practical approach. Students were informed on how the techniques and skills are used without giving them the opportunity to carry out the techniques in the field.

The documents analysis of the teachers’ schemes also showed no evidence of the teaching of fieldwork skills practically. Observations by the sampled A-level teachers also noted that A-level students graduate from O-level with gaps in basic map reading skills. Most students have problems in locating features using grid references. A sizeable number of the students usually fail in drawing sketch maps and sketch sections simply by their failure to locate the appropriate section on the map using the grid references. Such skills are expected to be well developed in the students by the end of form two. The teachers also observed the absence of basic map reading skills such as relating contour patterns to the landforms. Such skills are also expected to be well developed by the end of form 2. Students at A-level therefore face challenges in the drawing of sketch maps or sketch sections mainly because they fail to identify the landform features by studying the contour line patterns. Such gaps were quite evident in more than 80% of the marked written work given to the sampled A-level students.
Table 4.1: Percentage numbers of teachers teaching sketch maps, sketch sections and fieldwork.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percentage number of teachers allocating stipulated time (%)</th>
<th>0 hours</th>
<th>&lt; 1 hour</th>
<th>1-2 hours</th>
<th>3-4 hours</th>
<th>5+ hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sketch maps</td>
<td></td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>14</td>
<td>72</td>
</tr>
<tr>
<td>Sketch Sections</td>
<td></td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>28</td>
<td>58</td>
</tr>
<tr>
<td>Field Work</td>
<td></td>
<td>86</td>
<td>0</td>
<td>14</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The results discussed above depict the impact of a framed curriculum which focuses much on measurement at the end of a school period. Such a curriculum focuses on the end product and this type of curriculum is called the product model (Biddulph et al., 2015). This is also supported by Heidegger quoted in Nijhof and Bandsma (2013) where the curriculum is said to concentrate at achieving qualification requirements while missing the important goal of education. In this study some teachers left out some difficult topics as mentioned above in order to achieve high pass rates. Some of the topics left out are fundamental in developing concepts for example structural landforms are usually left out but the topic is the basis of geomorphology. In the schools subjects are also ranked according to pass rates and some cases incentives are awarded. The schools themselves are also ranked according to pass rates. Thus; the thrust in the schools is the end product and not the means to the end. This is in line with Kurebwa (2012) when he observed that, ranking of schools resulted in teachers concentrating their teaching on teaching possible examinations topics at the expense of a wide range of topics, skills and competences. Such a thrust has created some gaps in knowledge and skills in A-level geography graduates.

4.4 Causes of the knowledge and skills gaps

Research findings revealed several factors responsible for the knowledge and skills gaps in A-level students in Mutare urban schools. These include the following factors; the teacher, the school, the pupil, the syllabus, teaching methodology as well as measurement and assessment procedures.
4.4.1 Teacher factors

The results from interviews and questionnaires showed that the following teacher factors were responsible for causing the knowledge and skills gaps in A-level geography graduates; content gaps, teaching approaches and use of ICTs.

4.4.1.1 Content gaps

Interviews with the teachers revealed the existence of knowledge and skills gaps in the teachers themselves. Teachers tend to teach only those topics they understand clearly and which they were taught effectively while they were also still at school. A number of topics are left out by teachers (Fig. 4.4).

![Fig. 4.4: Percentage number of teachers who cover the given topics. Source: Field Data](image_url)

There is therefore a vicious cycle of content gaps where a teacher lacking certain content and skills will pass on the problem to their students who will in turn pass these gaps onto
their students as well, if and when they happen to end up in the classrooms. The focus group interviews with teachers showed that the teachers did not know the difference between a pediplain and a peneplain which is a basic expectation of the A-level syllabus. The formation of the landforms revolves around theories of pediplanation and peneplanation which teachers are not very clear of. A good geography teacher is one whose level of competence in content is high (Morgan and Lambert, 2005). Basing on the standard by Morgan and Lambert (2005) most of the geography teachers are not good teachers because they showed some gaps in their content.

4.4.1.2 Teaching approaches
The focused group interviews showed that most teachers in Zimbabwe have not been exposed to STEM education methodology – STEM being an abbreviation for Science, Technology, Engineering and Mathematics. Geography as a subject fits well into the STEM methodology. Geography is a science subject and also borrows some concepts from mathematics. The observations made in one of the lessons showed that the teachers were themselves not exposed to STEM education and methodology. A study of the schemes of work of all the teachers showed very little application of the following stem methodologies, problem-based learning, case-based learning, project-based learning and inquiry-based learning. The observed lessons also lacked the above listed methods.

The questionnaires as shown earlier indicated that some Mutare urban schools are completely leaving out some topics in physical geography like climatology. The content in climatology consists of physics, chemistry and mathematics of which the teachers are not exposed to. In one of the lessons where, climatology was taught, the teacher did not make use of mathematics in making illustrations in the teaching of adiabatic lapse rates. Experiments were not conducted in the teaching of condensation as was shown in the schemes of work. Out of the three schools; only one school indicated the teaching of slopes under geomorphology. Interviews with students also showed that some teachers use dictation of notes using a student with the teacher doing other engagements outside the classroom. Focus group interviews with lectures at Mutare Teachers’ College and Africa University also showed that no much use of mathematics and science is being done in the teaching of geography. These research findings go hand in hand with Alam (2009) who maintains that geography should be taught alongside earth sciences since it is scientific in
nature. Many geography teachers do not have a strong science and mathematics background.

4.4.1.3 Use of information Technologies (ICTs)
A visit into the schools was made and it was observed that all the sampled schools now have some computers which are connected to the internet. Despite these valuable resources the teachers are not making use of them in lesson preparation. The schemes of work do not reflect the use of information technologies. In the observed lessons teachers did not make use of information technologies. Interviews with the teachers also revealed that the teachers themselves had knowledge and skills gaps in information technologies. These findings are supported by studies in Kenya by Ondigi, (2012) when he said that teachers are ill equipped in ICT skills. This might explain why the teachers did not include ICTs in their schemes of work.

4.4.2 The school factors
The study came up with the following school factors, financial resources, attitudes, time table and enrolment.

4.4.2.1 Financial resources
Financial resources are one of the biggest challenges as shown in figure 5 below. In the questionnaires the students cited time as the main reason for not doing fieldwork (60%). The fee structures of the sampled schools do no cater for trips outside the school. The average fees for the sampled schools are $60 per term. Despite a low input from the fees, the parents are struggling to pay the small amounts. Interviews with the headmasters showed that, there budgets prioritized other cost centres such as sport and clubs which market their brands. Field work is an internal activity and unlike sport does put the school on the map. The interviews with both teachers and students revealed that the schools have very few text books for geography practicals. In one of the sampled schools students are sharing “Practical Geography of Africa”, at a ratio of 1:15.Schools do not have enough funds to buy books. This scenario is in line with studies carried out in Kenya where as many as six students would share one textbook making it impossible for them to complete their homework (Amadale at el., 2012).
4.4.2.2 Attitudes
The focus group interviews with teachers showed that some teachers were not keen to engage pupils in fieldwork because they felt that it was time consuming and very involving. The interviews showed that the teachers were involved in other income generating activities to supplement their low incomes. Some confessed that they did the bare minimum at work. Field work would eat into their time of making extra money. It was interesting to note that even schools with busses, the teachers were not engaging in field work. Some teachers, in spite of having the relevant qualifications and experience said that they lacked the required competencies for conducting fieldwork. This is in line with studies carried in Nigeria by Jegede and Ayeni (2013). They discovered that teachers exposed to fieldwork in their training had a more positive attitude in conducting fieldwork than those who did not. There research was in using field work in the teaching of ecology. Although the settings might be different some positive lessons are relevant in this study as indicated. This shows that the system is perpetuating skills and knowledge gaps. As mentioned above the attitude of headmasters also impacted on the schools. Of the three sampled schools, only one school head viewed geography as a practical subject requiring stem methodology in its teaching. The other heads give geography the same number of periods and financial resources with other none practical subjects and this has made it difficult for learners to acquire the relevant skills and knowledge. May be the school heads were not exposed to fieldwork in their training as observed by Jegede and Ayeni (2013) in their studies in Nigeria.

4.4.2.3 Time table
The time tables of the schools also showed that, field work was difficult to implement. All the sampled schools have periods which are thirty to thirty five minutes long and are double periods. The focus group interviews showed that it is difficult to carry out field work within the school environs in an hour. The teachers need at least two hours for activities within the school. These findings also agree with Wayne the education minister of Canada, Ontario when he said that teachers complained of inadequate time to cover syllabus items (NCCA, 2010). The Canadian teachers rushed children through so as to cover everything in the syllabus without covering much detail. Studies in Kenya by Muita (2013) showed similar results. Seventy four percent of the teachers in Kiamba district said that the time allocated to geography was inadequate because of its diversity. Such a scenario also created knowledge and skills gaps.
4.4.2.4 Enrolment

The average pupil to teacher ratio for the sampled geography classes is 1:36 against the ministry requirement of 1:25. The teachers sited that it was a big challenge to conduct field work with such groups. Such big groups posed serious problems of classroom management. The interviews also showed that the big classes negatively impacted on teaching map work and statistical geography. In one of the lessons observed it was a pity to see three students sharing a 1:50 000 topographical map. It was also observed that floor space is limited and out of the sampled schools only one has a geography room. A research carried by Ondigi (2012) in Kenyan schools also showed that large classes made the use of field work in teaching a big challenge.

Fig. 4.5: Reasons for not doing fieldwork. Source: Field Data
4.4.3 The Pupil factor

Evidence from interviews with the A-level teachers and students revealed that the gaps are a carryover from the gaps created at the O-level stage. The majority of students are enrolling into A-level with weak passes as shown in figure 6 below. Teachers lamented that most students entering A-level are unable to relate contour patterns to relevant landforms. This was also noted in 70% of the written work given to the A-level students. A greater percentage is unable to carry out simple location exercises using both grid references and compass points. Such skills are expected to have been developed as early as the ZJC. From the interviews with students and teachers there is evidence of a general feeling amongst students that certain topics are difficult and are impossible to score high marks. Students felt that topics such as climatology, geomorphology and structural landforms are too difficult to even attempt them. The above mentioned factors have contributed to a negative attitude against the subject. In Kenya, poor teaching methods have also resulted in a negative attitude against geography (Ondigi, 2012). Geography should be taught alongside the sciences (Alam, 2009). This enhances the scientific approach in the teaching of geography which may help in motivating students. The scientific approach may help stimulate interest in learning topics like climatology and geomorphology.
4.4.4 Syllabus factors

The study came up with the following syllabus factors, time and access. Time is the period needed to cover the syllabus. Access is the availability of the syllabus to its clients.

4.4.4.1 Time

The structure of the A-level syllabus is also another cause for the content and skills gaps in Mutare urban schools. The A-level geography syllabus in Zimbabwe is long and wide. The issue of a long and wide syllabus was also witnessed in Kenyan schools (Ondigi, 2012). Pupils endure high volumes of notes. The evidence from schemes of work showed that the time needed to effectively cover all the topics is not available. Most teachers lamented that the curriculum is overloaded with too much to cover in limited time. The topics covered in A-level geography, the required time and the actual time needed by
teachers is shown in table 4.2 below. The information gathered from interviews showed that the A-level geography syllabus requires a total of 80 weeks for effective teaching where all aspects stipulated in the document are covered. The instructional time available to the teachers for the whole course is 64 weeks. This leaves the teacher with a shortfall of 16 weeks. The instructional time becomes overloaded and this has forced teachers to focus on a few examinable areas and in the process missing out on key concepts and skills. This curriculum overload is in tandem with the scenario in China and the Philippines where curriculum content was described as overloaded making it difficult for pupils to complete it (APPA, 2008).
Table 4.2: The standard time required by the syllabus (weeks), time available to teachers and the deficit time.

<table>
<thead>
<tr>
<th>Syllabus item</th>
<th>Time required by the syllabus (weeks)</th>
<th>Average time taken by A-Level teachers (weeks)</th>
<th>Deficit (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Geography core topics</td>
<td>20</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Physical Geography optional topic</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Relevant techniques and Skills in physical geography</td>
<td>20</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Human Geography core topics</td>
<td>20</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Human Geography optional topic</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Relevant techniques and Skills in Human Geography</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>64</td>
<td>16</td>
</tr>
</tbody>
</table>

Source: Zimbabwe Schools Examination Council A-Level geography syllabus 9156 and Schemes of work

4.4.4.2 Access

Questionnaires given to students revealed that 66% of the students, did not have access to the syllabus document against 27% who were familiar with it. The minority of the students (7%) did not respond. The syllabus document is an important document which is the contract between the student and the examination body. This is also supported by Watkins (2012) when he said that the syllabus document gives the yardstick of pedagogic expectations and it also shows how the subject is to be taught. The implication was that, a good number of the students were not conversent with the expectations of the syllabus. Some relevant knowledge and skills gaps could have developed through this avenue.
4.5 Possible solutions to the skills and knowledge gaps

The study came up with the following intervention strategies, curriculum review, time management, teaching approaches, support materials and district subject clusters.

4.5.1. Curriculum Review.

The information collected from the interviews showed that there is need for the review of the curriculum. Both teachers and students expressed the fact that the curriculum is overloaded. Topics cannot be effectively covered in the two years of Advanced level. Topics such as structural landforms on a global scale requires removing from the optional topics and adding it to the core topics. The topic forms the basis for the study of geomorphology. Pupils fail to grasp concepts in geomorphology due to lack of knowledge.
related to geological history of landform development. The topic also plays a major role in
the understanding of fluvial processes. The structure and development of fluvial landforms
is a function of the geology as well as the related processes. These findings are supported by
Alam (2009), when he said that geography should be taught as an earth science discipline
alongside earth sciences and geology. This approach gives learners a scientific background
which enables them to handle the difficult aspects of physical geography.

4.5.2 Time Management
To overcome the problem of time a number of solutions were suggested in the interviews by
teachers. Trimming down the existing curriculum is almost impossible. Muita (2012)
suggested trimming so as to focus on major aspects the syllabus. Teachers in their
interviews believed that trimming would water down the subject. Increasing the length of
the period as well as the number of periods may also be very difficult or impossible bearing
in mind the need to share the available time amongst the several subjects. Interviews with
the teachers and lecturers suggested the prompt marking of the Ordinary Level
examinations. This can be achieved by recruiting and training more markers so that less
time is taken to complete the marking exercise. Another strategy to speed up marking is to
adopt and implement E-marking in O-level geography. The earlier release of O- level
results will enable Lower 6th students to commence their studies earlier than currently. The
current scenario is that A- level students begin lessons in early March. This means that
effectively they utilise just one month in the first term. With the prompt marking
suggestion, A- level studies may be started by the mid of January creating almost two
months of additional teaching and learning time to the current time. This strategy may
however face financial constraints especially in the lack of funds to support a larger number
of markers.

Distance learning was also cited in the interviews as part of the solution to manage time.
With many schools now connecting to the internet, several e-learning platforms can be used
to reach students in the comfort of their homes at any given time. However this strategy is in
the long-term since ICTS are expensive to install and to run. This is in line with Yaunie,
(2012) cited in Leask, (2012) who maintained that ICT gadgets are very expensive and out
of reach to many schools. Their application would need fiscal support from the central
government.
4.5.3 Teaching Approaches
The research came up with the following teaching approaches, topic integration, stem methodologies and use of ICTs.

4.5.3.1 The integrated approach
Questionnaires sampled from A-level teachers revealed that 25% of the teachers teach each topic independently. The focus group interviews with teachers and lectures also showed the need for teachers to be staff-developed so as to adopt the integrated approach to teaching the topics. Results from one on one interviews with heads of geography and the provincial subject inspector also showed the same view. The focus group interviews with teachers and lectures also revealed that, when covering climatology one may conclude the topic by looking at climatic hazards thereby covering climatology and hazardous environments concurrently. The results also revealed that, in covering structural landforms one may also tackle hazardous environments related to the structural landforms. The same was said when covering of hydrology and fluvial processes hazards related to flooding may also be covered. The integrated approach was also supported by Bamusiime (2010). Integrated knowledge assisted students in making effective decisions about problems. Learners also see the world as an integrated whole.

4.5.3.2 STEM methodologies
The interviews with teachers, lectures and students also suggested that, methodology should be reviewed so as to incorporate STEM in the teaching of geography. The term STEM stands for Science, Technology, Engineering and Mathematics. This is an interdisciplinary approach to learning which integrates academic concepts with real world lessons. In STEM students make use of science, technology, engineering and mathematics to make connections between school, community, work and the global enterprise (Bybee, 2013). The goals of STEM were also explained in the invitation to the 2nd International science and mathematics Educators’ Conference by the Bindura University of Science Education. STEM education is said to be aimed at creating critical thinkers as well as increasing ability to read and write.

The main goal of STEM is to “develop in the recipients of education the skills of innovation which would lead to new products that sustain the economy,” (Bindura University of Science Education Invitation to the 2nd International Science and Mathematics
Educators’ Conference). The focus group interviews with the lectures at Mutare Teachers College and Africa University showed that the teacher training colleges should strengthen the following STEM methodologies, problem-based learning, case based learning, project based –learning and inquiry-based learning.

4.5.3.3 Use of Information Communication Technology (ICTs)
In the focus group interviews 70% of the teachers said that use of ICTs in the teaching of geography should be enhanced. ICTs promote skills of graphicacy, statistical and spatial analysis. Fifty percent of the interviewed teachers were computer literate as far as micro soft word. Only 10% were literate in Geographical Information Systems (GIS). Alam (2009) also recommended spatial competencies as way of understanding spatial conditions at local, regional, national and global levels. He suggested the following spatial competencies for teachers, Geographical Information Systems (GIS), Remote Sensing, Google Earth, NASA’s World Wind and Wikimapia. Such competencies are necessary for the A-level teachers.

4.5.4 Support materials
Interviews with teachers also revealed the importance of teaching and learning materials for both teachers and students. The teachers expressed the need to develop modules on practical geography focussing on the relevant skills and knowledge. The modules must cover all the important activities for the A- level geography teacher and learner and should embrace stem methodology. These observations are in tandem with those made in India by Alam (2009) who proposed that schools must be supported with quality books. Quality books are those which have sufficient information and promote the interests of the readers. Such books are easy to understand and thought provoking. However, the production of such modules entails fiscal support from the government and a financial commitment from parents.

4.5.5 District subject clusters
Teachers and lectures in the focus group interviews also called for the revival of subject clusters. It was emphasised that teachers must revive district subject clusters and revive the Geographical Association of Zimbabwe. Alam (2009) also suggested the establishment of subject associations and workshops to look after geography in India. The purpose of the clusters would be to enable teachers to exchange ideas and writing of research papers on content and pedagogic of the subject. The clusters would also create a forum for interaction
with other stakeholders like the Ministry of Primary and Secondary Education, Zimbabwe Schools Examination Council, tertiary institutions and the corporate world at large. This collaborative effort would go far in addressing the knowledge and skills gaps. The collaborative approach was also propounded by Beecher and Sweeney (2008) when they said that the closing of gaps is achieved by involving family and community.

4.6 Summary
The teachers from the sampled schools are qualified to teach A-level and all hold relevant degrees and professional qualifications but lack in carrier development. Findings from the research confirm the existence of both knowledge and skills gaps in physical and human geography. The gaps are a result of several factors which include the following, resources, teacher, school and pupil factors as well as curriculum issues. Curriculum overload was cited as one of the variables that compromised the effectiveness of teachers. Absence of stem methodologies contributed significantly in creating knowledge and skills gaps. A list of possible solutions was suggested, which included the following, curriculum review, and timing, teaching approaches, support materials and district subject clusters. It was emphatic that teachers must embark on stem methodologies in order to close the gaps. Reviving of subject clusters was also suggested as a way towards cross-fertilisation of ideas from various stakeholders.
CHAPTER 5
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction
The chapter gives a summary of the research, highlighting the objectives of the research and the research problem. The chapter also gives a response to the research questions. A summary of the literature review, research design and instruments is also given. The study also addresses the research findings, summary of the research, conclusions and recommendations. Gaps noted during the research, which the research did not address are also highlighted.

5.1 Summary
The first objective of the research was to identify the knowledge and skills gaps amongst A-level graduates. The second objective was to establish the causes for such gaps. The last objective was to suggest appropriate intervention strategies.

The research problem is the glaring knowledge and skills gaps in A-level geography graduates. These gaps have manifested themselves in tertiary institutions and other consumers of the A-level geography graduates. The literature review also established the prevalence of such gaps in Kenya, China and the U.S.A. The literature review gave the researcher some insights into the research problem. Three urban schools were sampled from a population of nine schools using both stratified and convenient sampling. The qualitative research approach was employed. The research instruments used included, questionnaires, interviews, observations and document analysis.

The research findings showed the occurrence of knowledge gaps in the following physical geography topics; climatology, biogeography, slope investigations and structural landforms. Skills gaps in physical geography were visible in map skills, aerial photo interpretation, field sketching and experimentation. In human geography the knowledge gaps were noted in both industrial and settlement studies. Skills gaps in human geography were in research skills, graphicacy, numeracy and field sketching. The results showed that the knowledge and skills gaps are caused by the following factors, school, pupil, teacher, resources and the syllabus.
The study came up with some possible solutions. The use of STEM methodology in the teaching of geography in schools and tertiary institutions was suggested. The use of the intergraded approach was also suggested; where topics which are linked are fused. The use of ICTs was also suggested as a way of promoting distance education. Distance education was seen as a measure which helps to reduce contact time with the A-level learners and this reduces the curriculum overload on the teacher and the student. There was also a suggestion to revive the district subject clusters. The clusters would create a forum for interaction with the various stakeholders. Teachers also requested the production of resource materials for them and for the learners.

5.2 Conclusions
The first research question was on identifying knowledge and skills gaps amongst A-level graduates. The results of the research show that, A-level graduates are leaving the schools system with glaring knowledge and skills gaps in both human and physical geography. This is further supported by questionnaires of students which show that 60% of the students were discouraged from studying climatology and 33% were discouraged from taking Biogeography. Only 33% were not discouraged from taking any of the core topics. The results show that the A-level student is deprived of knowledge in climatology, biogeography and slope investigations. Out of at least 9 skills stipulated in the physical geography syllabus only 2 are covered. A total of 86 % of the sampled students and teachers cover sketch maps and sketch sections only, while 14% cover sketch sections, sketch maps and fieldwork. The results show that A-level graduates are deprived of skills in field sketching, research skills and aerial photo interpretation. The lesson observations showed that the teachers did not help pupils in landform demarcation when teaching sketch maps.

The second research question was on the causes of the knowledge and skills gaps. The results of the research show that the gaps have been created by the interaction of a number of factors which include the, school, pupils, teachers and the syllabus. Figure 5.1 below shows the synergies around the problem. The tertiary institutions which are the main absorbers of the A-level graduate are perpetuating the gaps by giving little attention to them. The trained teachers from tertiary institutions are coming back to the school system with their initial gaps forming a vicious cycle. However, the research did not give a rating on how these variables impact on the knowledge and skills gaps. This leaves another gap for further research.
The third research question was on the suggested intervention strategies of reducing the knowledge and skills gaps. The results of the study showed that, STEM methodology is critical in the teaching of geography as was pointed out in interviews with teachers and students. Geography is a science subject and it borrows its methodology from the sciences. The integrated approach was also suggested by the teachers. Distance education through the use of ICTs was also suggested. Teachers were advised to make use of e-learning platforms in teaching some of the topics and the use of the internet by pupils to access information. This would reduce curriculum overload. District subject panels were seen to be very critical as these would encourage cross fertilization of ideas from various stakeholders.

**Fig. 5.1** The interactions of variables responsible for creating knowledge and skills gaps.

![Diagram of variables responsible for creating knowledge and skills gaps](image)

Source: Researcher

### 5.3 Recommendations

The study made some recommendations to the following stakeholders, government, schools, teachers and the Zimbabwe Schools Examination Council (ZIMSEC).
5.3.1 Government

The study recommends to the government via the Ministry of Primary and Secondary Education, to promote STEM methodology in the teaching of geography in both schools and tertiary institutions as a way of breaking the vicious cycle. This can be achieved by mounting staff development workshops for stakes in education.

The research also advises subject inspectors to revive district subject panels and to coordinate them. This promotes a holistic approach to the teaching of the subject. The use of ICTs in the teaching and learning of the subject should be intensified. Distance learning through e-learning platforms should be considered as it helps in offloading the curriculum. To enhance the use of ICTS, the government should promote the development of skills in ICT.

The above mentioned recommendations require fiscal support. This research did not study ways in which the government can fund these. This remains another gap for research on how these programs can be funded by the central government whose finances are already strained.

5.3.2 Schools

The research recommends schools to provide the necessary resources for field work to the geography subject area in terms of equipment, transport and time. Schools should treat geography as a STEM subject which requires scientific methodology. Geography therefore, requires a laboratory for conducting experiments a feature that does not exist in most schools.

5.3.3 Teachers

The study advises teachers to upgrade their knowledge and skills in climatology, biogeography, slope investigations, structural landforms, settlement, industrial studies, field sketching, map skills, graphicy and numeracy and research. This can be achieved through staff development sessions in schools and in district subject clusters.

5.3.4 Zimbabwe Schools Examination Council (ZIMSEC)

The study recommends to ZIMSEC to restructure the A-level syllabus by integrating topics and incorporating the STEM methodology. Structural landforms should not be an optional
topic since it forms the basis for the understanding of geomorphology. The examination items should discourage rot learning.

5.4 Summary of Chapter
The chapter gave a summary of the research findings. The research findings showed that the A-level graduates are leaving the schools with noticeable knowledge and skills gaps. The chapter also drew some conclusions from the findings. Some recommendations were given to government, schools, teachers and the Zimbabwe Schools Examination Council. The study recommends further research on the integration of geography topics.
REFERENCES


Bindura University of Science Education: Invitation to the second international science and mathematics educators’ conference.


Bybee, R. W., (2013). The case for STEM Education: Challenges and Opportunities. NSTA Press, USA.


Hajdini, J. (2008). Information communication technology: impact in international companies’ strategies, structures and productivity and environmental pollution research paper. Druck and Binding, Germany.


APPENDICES

Appendix 1: Clearance letter from the Ministry of Primary and Secondary Education

All communications should be addressed to
"The Secretary for Primary and Secondary Education"
Telephone: 799914 and 705153
Telegraphic address: "EDUCA 710N"
Fax: 791923

Reference: C/426/3
Manicaland
Ministry of Primary and Secondary Education
P.O.Box CY 121
Causeway
Harare
Zimbabwe

28 August 2015

Agnes Kundhlande
2863 Chikanga
Phase 2
Mutare

RE: PERMISSION TO CARRY OUT RESEARCH IN MANICALNAD PROVINCE:

MUTARE DISTRICT: DANGAMVURA AND MUTATRE HIGH, AND SAKUBVA SECONDARY SCHOOLS

Reference is made to your application to carry out a research at the above mentioned schools in Manicaland Province on the research title:

"THE IMPACT OF THE GEOGRAPHY ADVANCED LEVEL CURRICULUM ON THE ACQUISITION OF RELEVANT KNOWLEDGE AND SKILLS IN ADVANCED LEVEL GRADUATES IN MUTATRE URBAN."

Permission is hereby granted. However, you are required to liaise with the Provincial Education Director Manicaland, who is responsible for the schools which you want to involve in your research. You should ensure that your research work does not disrupt the normal operations of the school.

You are required to provide a copy of your final report to the Secretary for Primary and Secondary Education by December 2015.

E. Chinyowa
Acting Director: Policy Planning, Research and Development
For: SECRETARY FOR PRIMARY AND SECONDARY EDUCATION
cc: PED - Manicaland Province
DEPARTMENT OF EDUCATION
P Bag 1020
BINDURA, Zimbabwe
Tel: 0271 – 7531 ext 1038
Fax: 263 – 71 – 7616
Email: grzinyeka@buse.ac.zw

BINDURA UNIVERSITY OF SCIENCE EDUCATION

10 March 2015

TO WHOM IT MAY CONCERN

RE: NAME: KUNDHLANDE AGNES
REGISTRATION NUMBER: RB91066K
PROGRAMME: MScED
PART: 2:1

This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

The student has to undertake research and thereafter present a Research Project in partial fulfillment of the Diploma in Science Education/Bachelor of Science Degree/Bachelor of Science Honours Degree/Masters of Science Education Degree programme. The topic of the research is "The Impact of the A level Geography Curriculum on Classroom Practice in Mutare Urban Schools".

In this regard, the department kindly requests your permission to the student to carry out his/her research in your institution.

Your co-operation and assistance is greatly appreciated.

Thank you

G. Zinyeka [Mr]
Co-ordinator
Appendix 3: Focus group interview questions for teachers, lectures and students

1) Tertiary institutions in and around Mutare claim the existence of skills and knowledge gaps in geography post A-level students. Do you think this is a justified claim?

2) In your opinion what are the causes of the skills and knowledge gaps in post A-level geography students?

3) In your thinking what intervention strategies can be taken to close these skills and knowledge gaps?

Appendix 4: One on one interview questions for teachers, lecturers, heads of geography departments and provincial geography subject manager

1) In your own opinion, are A-level geography students leaving high schools with adequate knowledge and skills?

2) What do you think are the causes of these knowledge and skills gaps in A-level geography graduates?

3) Suggest intervention strategies to reduce these knowledge and skills gaps in A-level geography graduates.
Appendix 5: Questionnaire for students

Declaration of confidentiality

I am a student at the Bindura University of Science Education reading for a Masters Degree in Science Education Geography. As part of the requirements of this programme I am conducting a research on the occurrence of knowledge and skills gaps in A-level Geography graduates in Mutare Urban Schools. May you kindly supply me with the necessary information. No confidential information is required and any data collected will be kept in strict confidence and shall be used for academic purposes only.

Name of School

Location (tick in one appropriate box)

| Sakubva | Dangamvura | Town Area |

Date----------------  Age------------------   Sex----------------

1) Do you have details of the topics you are expected to cover by the A-level geography syllabus? (tick in one appropriate box)

YES ☐ NO ☐

2) Do you have details of the skills you are expected to acquire by the end of your studies at A-level? (Tick in one appropriate box)

YES ☐ NO ☐

3) Were you given a copy of the A-level geography syllabus at your school?

YES ☐ NO ☐

4) Of the four paper 1 core topics listed below, tick those that are completely covered in class.

| Climatology | Hydrology | Geomorphology | Biogeography | None of the above |

81
5) Of the four core topics listed below, tick those that teachers discourage you from spending time on.

<table>
<thead>
<tr>
<th>Topic</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Climatology</td>
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<tr>
<td>Hydrology</td>
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<tr>
<td>Geomorphology</td>
<td></td>
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<tr>
<td>Biogeography</td>
<td></td>
</tr>
<tr>
<td>None of the above</td>
<td></td>
</tr>
</tbody>
</table>

6) How many optional topics are covered in detail in class? (Tick in the appropriate box)

<table>
<thead>
<tr>
<th>Number</th>
<th></th>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
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<tr>
<td>None</td>
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<tr>
<td>All</td>
<td></td>
</tr>
</tbody>
</table>

7) Which relevant techniques and skills in physical geography are taught by your teacher from the list below?

- Map interpretation [ ]
- Sketch maps [ ]
- Sketch section [ ]
- Block diagrams [ ]
- Photograph interpretation [ ]
- Annotated sketch diagrams [ ]
- Measurement and mapping of landforms [ ]
- Weather observations [ ]
- Vegetation mapping [ ]
- Hydrological techniques [ ]
- Graph interpretation and drawing [ ]
- None of the above [ ]

8) How often do you carry out fieldwork? (Tick in the appropriate box below)

- Once every week [ ]
- Fortnightly [ ]
- Monthly [ ]
- Once a term [ ]
- None of the above [ ]

9) What are the reasons for not doing fieldwork in your school? (Tick in the appropriate box below)

- Inadequate time [ ]
- Shortage of equipment [ ]
- Lack of funding by school/parents [ ]
- Other specify [ ]

10) Which topic did you cover first in physical geography?

--------------------------------------------------------------------------------
11) In human geography which techniques are taught in class? (Tick in the appropriate box)

- Techniques for showing distribution and patterns
- Interpretation of graphs and tables
- Dot maps
- Proportional symbols
- Isoline maps
- Density maps
- Bar graphs
- Pie diagrams
- Flow line maps
- Age-sex pyramids
- Fieldwork

12) Of the four core topics in human geography, how many are covered in class? (Tick in the appropriate box)

- One
- Two
- Three
- All four
- None

13) Of the optional topics in human geography, how many are covered by the teacher? (Tick in the appropriate box)

- One
- Two
- Three
- All four
- None

14) Which of these human geography optional topics are covered in class? (Tick topics covered in class)

- Mining, Fuel and Power
- Environmental Management
- Transport and trade
- Economic Development and Planning
- None of the above

15) How often does your teacher refer to science/mathematics in the teaching of concepts in both human and physical geography?

- Very frequently
- Frequently
- Occasionally
- Never
[16] How competent are you in using the following computer applications in the learning of A-level geography?

<table>
<thead>
<tr>
<th>Computer application</th>
<th>Not competent</th>
<th>Competent</th>
<th>Very competent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Word</td>
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<td>Microsoft Excel</td>
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<td>Skype</td>
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<td>Google Maps</td>
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<tr>
<td>Geographical Information Systems</td>
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</table>

[17] What measures should be taken to reduce knowledge and skills gaps in A-level geography graduates?

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End
Appendix 6: Questionnaire for A-level teachers

Declaration of confidentiality

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Name of School---------------------------------------------------------------------------------------------

Location (tick in one appropriate box)

- Sakubva
- Dangamvura
- Town Area

Date---------------- Age------------------ Sex-----------------

1) Do you have details of the topics you are expected to cover by the A-level geography syllabus? (tick in one appropriate box)

- YES
- NO

2) Do you have details of the skills you are expected to acquire by the end of your studies at A-level? (Tick in one appropriate box)

- YES
- NO

3) Were you given a copy of the A-level geography syllabus at your school?

- YES
- NO

4) Of the four paper 1 core topics listed below, tick those that are completely covered in class.

- Climatology
- Hydrology
- Geomorphology
- Biogeography
- None of the above
5) Of the four core topics listed below, tick those that teachers discourage you from spending time on.

<table>
<thead>
<tr>
<th>Climatology</th>
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</thead>
<tbody>
<tr>
<td>Hydrology</td>
<td></td>
</tr>
<tr>
<td>Geomorphology</td>
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<tr>
<td>Biogeography</td>
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<tr>
<td>None of the above</td>
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</tbody>
</table>

6) How many optional topics are covered in detail in class? (Tick in the appropriate box)

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- Photograph interpretation [ ]
- Annotated sketch diagrams [ ]
- Measurement and mapping of landforms [ ]
- Weather observations [ ]
- Vegetation mapping [ ]
- Hydrological techniques [ ]
- Graph interpretation and drawing [ ]
- None of the above [ ]

8) How often do you carry out fieldwork? (Tick in the appropriate box below)

<table>
<thead>
<tr>
<th>Once every week</th>
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<tbody>
<tr>
<td>Fortnightly</td>
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<td>Monthly</td>
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<tr>
<td>Once a term</td>
<td></td>
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<tr>
<td>None of the above</td>
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</tbody>
</table>

9) What are the reasons for not doing fieldwork in your school? (Tick in the appropriate box below)

<table>
<thead>
<tr>
<th>Inadequate time</th>
<th></th>
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<tbody>
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<tr>
<td>Other specify</td>
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10) Which topic did you cover first in physical geography?

-----------------------------------------------------------------
11) In human geography which techniques are taught in class? (Tick in the appropriate box)

| Techniques for showing distribution and patterns |   |
| Interpretation of graphs and tables |   |
| Dot maps |   |
| Proportional symbols |   |
| Isoline maps |   |
| Density maps |   |
| Bar graphs |   |
| Pie diagrams |   |
| Flow line maps |   |
| Age-sex pyramids |   |
| Fieldwork |   |

12) Of the four core topics in human geography, how many are covered in class? (Tick in the appropriate box)

| One |   |
| Two |   |
| Three |   |
| All four |   |
| None |   |

13) Of the optional topics in human geography, how many are covered by the teacher? (Tick in the appropriate box)

| One |   |
| Two |   |
| Three |   |
| All four |   |
| None |   |

14) Which of these human geography optional topics are covered in class? (Tick topics covered in class)

| Mining, Fuel and Power |   |
| Environmental Management |   |
| Transport and trade |   |
| Economic Development and Planning |   |
| None of the above |   |

15) How often does your teacher refer to science/mathematics in the teaching of concepts in both human and physical geography?

| Very frequently |   |
| Frequently |   |
| Occasionally |   |
| Never |   |
[16] How competent are you in using the following computer applications in the learning of A-level geography?

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<tr>
<td>Geographical Information Systems</td>
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</table>

[17] What measures should be taken to reduce knowledge and skills gaps in A-level geography graduates?

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END
Appendix 7: Observation sheet for lesson delivery, schemes of work and written work for A-level teachers

[Please indicate by a tick where applicable]

<table>
<thead>
<tr>
<th>[a] CONTENT COVERAGE</th>
<th>Inadequate</th>
<th>Barely adequate</th>
<th>Adequate</th>
<th>Very adequate</th>
</tr>
</thead>
<tbody>
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<td><strong>Core topics</strong></td>
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<tr>
<td>PHYSICAL GEOGRAPHY</td>
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<tr>
<td>Climatology</td>
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<tr>
<td>Hydrology and fluvial processes</td>
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<tr>
<td>Geomorphology</td>
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<tr>
<td>Biogeography</td>
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<tr>
<td>Map work</td>
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</tr>
<tr>
<td>Fieldwork</td>
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<tr>
<td><strong>Optional topics</strong></td>
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<tr>
<td>Structural landforms on a global scale</td>
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<tr>
<td>Hazardous environments</td>
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[b] METHODOLOGY

Lecturing
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1.0 PREAMBLE

The Geography and Environmental Studies syllabus is designed for the Secondary Teachers’ Diploma in Education. This two-year pre-service course is based on a 2-2-2 model. It is intended for students who have passed both ‘O’ and ‘A’ Level Geography and ‘O’ Level Mathematics and Science. The level of teaching is expected to approximate first year university work. The course is designed to enable the product to teach Geography and Environmental Studies up to ‘O’ level. The range of the topics, concepts and activities contained in the syllabus needs an informed, holistic response to a lifelong process that develops skills, attitudes and values that are necessary for appropriate environmental management and sustainable development in the society.

2.0 AIMS

The general aims of the Geography and Environmental Studies course are to:

2.1 produce a competent, versatile, committed and resourceful secondary school teacher;

2.2 widen and deepen students’ knowledge in Geography and Environmental Studies at a local, regional and global scale;

2.3 equip students with relevant research skills;

2.4 develop skills, attitudes and values that are necessary for appropriate environmental management and sustainability and
2.5 develop an appreciation of all forms of knowledge with particular reference to indigenous knowledge systems (IKS).

3.0 OBJECTIVES

By the end of the course students should be able to:

3.1 define and explain relevant terms and concepts used in Geography and Environmental Studies;

3.2 demonstrate knowledge of the physical, economic and social geography and the processes involved in them;

3.3 apply relevant principles, theories and models to reality;

3.4 identify environmental problems, causes and effects at local, national, regional and global levels;

3.5 suggest possible action oriented responses to the environmental issues, problems and crises at local, national, regional and global levels;

3.6 describe how processes bring changes in systems, distributions and environments;

3.7 collect, record and interpret information from primary (fieldwork) and secondary sources (e.g. statistical data);

3.8 demonstrate skills of analysis, synthesis and explanation;

3.9 competently teach ZJC and ‘O’ level Geography and

3.10 use Information Communication Technology (ICT) and other forms of knowledge such as Indigenous Knowledge Systems (IKS) in their learning and teaching.
4.1 Nature and Scope of Geography and Environmental Studies:

4.1.1 Developments in Geography;

4.1.2 Developments in Environmental Studies;

4.1.3 Nature of environmental issues, problems and crises at local, regional and global scale;

4.1.4 Environment Impact Assessment;

4.1.5 Responses to environmental issues, problems and crises such as;

4.1.5.1 Environmental policy, legislation and institutional framework at local, regional and global levels and

4.1.5.2 Environmental Education/ ESD.

4.2 Physical Geography

4.2.1 Geomorphology:

4.2.1.1 Introduction to geomorphology;

4.2.1.2 Geological geomorphology;

4.2.1.3 Silicate minerals;

4.2.1.4 Rock types and weathering;

4.2.1.5 Tropical landforms;

4.2.1.6 Diastrophism and related landforms;

4.2.1.7 Slopes and mass movements and

4.2.1.8 Environmental hazards and the responses in geomorphology at local, regional and global scale.
4.2.2 **Hydrology:**

4.2.2.1 The hydrological cycle and human impact;

4.2.2.2 Catchment areas of Zimbabwe and their management;

4.2.2.2.1 A case study of the Zambezi Valley drainage basin.

4.2.2.3 Surface and ground water hydrology;

4.2.2.4 Hydrographs;

4.2.2.5 Measurement of infiltration and stream discharge;

4.2.2.6 Environmental hazards and the responses in hydrology at local, regional and global scale.

4.2.3 **Climatology:**

4.2.3.1 Nature and scope of climatology;

4.2.3.2 Weather elements and their measurement

4.2.3.2.1 The Weather Station- digital and conventional;

4.2.3.2.2 Weather forecasting and synoptic charts.

4.2.3.3 The Earth’s Atmosphere.

4.2.3.3.1 Composition of the atmosphere and

4.2.3.3.2 Vertical temperature structure.

4.2.3.4 Radiation and the energy budget;

4.2.3.5 Air temperature;

4.2.3.5.1 Spatial variations in temperature and

4.2.3.5.2 Stability and instability and the related weather conditions.

4.2.3.6 Atmospheric moisture and precipitation:
4.2.3.6.1 Condensation;

4.2.3.6.2 Precipitation theories;

4.2.3.6.3 Forms of precipitation and

4.2.3.7 Atmospheric circulation:

4.2.3.7.1 Air masses and related types of rainfall

4.2.3.7.2 Global circulation models

4.2.3.8 Climate change and variability

4.2.3.8.1 Nature of global climate change and variability at local, regional and global scale

4.2.3.8.2 Weather hazards related to climate change and variability at local, regional, global scale and the respective responses

4.2.4 Biogeography:

4.2.4.1 The nature and scope of Biogeography;

4.2.4.2 Main biomes such as equatorial, savannah and desert vegetation;

4.2.4.3 Ecosystems: major components of the ecosystem;

4.2.4.4 Plant succession and climatic climax vegetation and

4.2.4.5 Human and natural impact on ecosystems and their responses at local, regional and global scale.
4.2.5 Soils:

4.2.5.1 Soil forming factors;
4.2.5.2 Soil forming processes (pedogenic processes);
4.2.5.3 Soils of Zimbabwe and the respective agro ecological zones;
4.2.5.4 Soil erosion and its impact on the environment at local, regional and global scale
4.2.5.5 Sustainable management of soils

4.3 Human, Economic and Social Geography

4.3.1 Economic and Development Geography;

4.3.1.1 Origin and development of Economic Geography;
4.3.1.2 Nature and scope of economic development;
4.3.1.3 Measurement and classification of economic development;
4.3.1.4 Models and theories of development and underdevelopment;
4.3.1.5 Regional inequalities;
4.3.1.6 Globalization and its impact on development and
4.3.1.7 Primary activities in the economic system.
4.3.1.7.1 Agricultural systems and their impact on the environment and the respective responses at local, regional and global scale.
4.3.1.7.2 The sustainable exploitation of mineral resources
4.3.1.8 Secondary activities in the economic system
4.3.1.8.1 Manufacturing industries:
4.3.1.8.2 Development of the manufacturing industry, their impact on the environment and the respective responses at local, regional and global scale.

4.3.1.9 Secondary activities in the economic system which include, tourism, transport and trade.

4.3.1.9.10 The impact of service industries on the environment and the respective responses at local, regional and global scale.

4.3.2 Population:

4.3.2.1 Population concepts;

4.3.2.2 Sources of population data;

4.3.2.3 Theories of population growth;

4.3.2.4 Population growth and resources;

4.3.2.5 Population migrations and

4.3.2.5 Over population and under population problems and the respective responses at local, regional and global scale.

4.3.3 Settlement:

4.3.3.1 Nature of settlements;

4.3.3.2 Settlement hierarchy;

4.3.3.3 The urban sphere of influence;

4.3.3.4 Location theories and their application;

4.3.3.5 Urban settlements:

4.3.3.5.1 The urban functional zones and
4.3.3.5.2 Theories of urban structure and their application.

4.3.3.6 Urbanization and urban growth:

4.3.3.6.1 Effects of urbanization and urban growth and

4.3.3.6.2 Responses to the effects of urbanization and urban growth at local, regional and global scale.

4.4 Practical Geography

4.4.1 Map reading, interpretation and analysis:

4.4.1.1 The nature of maps;

4.4.1.2 Value of maps to geographers;

4.4.1.3 Basic information on the map sheet;

4.4.1.4 Scale and direction;

4.4.1.5 Basic calculations such as area, bearing and map reduction and enlargement;

4.4.1.6 Analysis of topographical maps:

4.4.1.6.1 Methods of representing relief on maps;

4.4.1.6.2 Contour lines;

4.4.1.6.3 Relief and drainage maps;

4.4.1.6.4 Sketch maps;

4.4.1.6.5 Gradient;

4.4.1.6.6 Vegetation, soils and climate maps.

4.4.1.7 Human geography maps.

4.4.1.7.1 Population distribution maps;

4.4.1.7.2 Settlement distribution maps such as rural and urban settlement maps.

4.4.1.8 Economic maps.
4.4.2 Data Collection, Presentation and Analysis:

4.4.2.1 Research designs and action research;

4.4.2.2 Data collection instruments such as questionnaire, interview and tests;

4.4.2.3 Sampling and

4.4.2.4 Data processing techniques and use of Geographical Information Systems (GIS).

5.0 STRATEGIES

Methods that will be used include:

5.1 lectures;

5.2 demonstrations;

5.3 fieldwork;

5.4 field surveys;

5.6 case studies;

5.7 modelling;

5.8 research;

5.9 experimentation;

5.10 group work;

5.11 observation;

5.12 role play;

5.13 simulation;

5.14 games;

5.15 use of Information Communication Technology (ICT);
6.0 ASSESSMENT

6.1 The methods of assessment include the following:

6.1.1 written work and exercises;

6.1.2 displays;

6.1.3 essays;

6.1.4 projects;

6.1.5 presentations;

6.1.6 supervision;

6.1.7 portfolio;

6.1.8 tests and

6.1.9 examinations.

6.2 Final Assessment:

Final assessment comprises of coursework and examinations.

6.2.1 Coursework;

Coursework consists of two major assignments to be done while students are on teaching practice. The first assignment is a field-based essay on environmental studies. The second one is based on students’ teaching practice experiences.

Two tests will be written in the final two terms in college.
6.2.2 **Examinations:**

The final examination will consist of three papers.

6.2.2.1 Paper I (100): Geography Practical.

This paper consists of two sections.

Section A: Map Work.

Section B: Statistical Geography.

Duration: 3 hours

6.2.2.2 Paper II (100) Physical and Human Geography.

This paper consists of four sections:

Section A: Geomorphology and Hydrology;

Section B: Climatology, Biogeography and Soils;

Section C: Population and Settlement and

Section D: Human, Economic and Social Geography.

Candidates are expected to answer one question from each section.

Duration: 3 hours

6.3 **Weighting:**

6.3.1 Coursework 30 %

6.3.2 Examination 70%.

In order to pass the course the student is required to pass coursework and examination with a minimum of 50% in each of the two components.
Appendix 9: A-Level Geography Syllabus

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL (ZIMSEC)

ADVANCED LEVEL SYLLABUS

GEOGRAPHY 9156

EXAMINATION SYLLABUS FOR 2013 - 2016
PREAMBLE

Geography occupies a pivotal position in the understanding and interpretation of social, economic, political and environmental conditions and change, both spatial and temporal. This syllabus is designed to produce an A- level Geography graduand

☐ that can be a self-reliant and productive student with a clear understanding of the socio-economic problems facing Zimbabwe as part of a family of nations;

☐ that is able to cope with further tertiary education and be adaptable and marketable in the world of work;

☐ that is dynamic and holistic to understanding the interactions that are taking place in Zimbabwe and the world in which we live;

☐ that is appreciative of their own country Zimbabwe and the world, with knowledge, skills and decision-making qualities that are required for the ever-changing needs of Zimbabwe.

The student needs to realise how people impress their ways, habits and economic demands upon the environment and to develop a sense of awareness and responsibility towards the management of this environment, ultimately leading towards sustainable development.

AIMS

The aims of this syllabus describe the educational purposes of a course in Geography at Advanced Level. These are to:

☐ develop awareness of the relevance of geographical analysis to understanding and solving contemporary human and environmental problems;

☐ introduce students to the main components of Physical and Human Geography and the inter-relationships between these components;

☐ encourage an understanding of the principal processes operating at different scales within Physical and Human Geography;

☐ develop a sense of relative location, including an appreciation of the complexity and variety of natural and human environments;

☐ demonstrate and explain the causes and effects of change over space and time on the natural and human environment;

☐ demonstrate the importance of scale in understanding Physical and Human Geography;

☐ make students aware of the problems of explanation (including data collection
and processing) in Physical and Human Geography, and to give them an appreciation of the nature, value, limitations and importance of different approaches to analysis and explanation in Geography.

For Skills and Attitudes, the aims are to:

☐ increase knowledge of, and ability to use and apply, appropriate skills and techniques relevant to the greater understanding and interpretation of facts and relationships in Physical and Human Geography;

☐ encourage a concern for accuracy and objectivity in collecting, recording, processing, analysing, interpreting and reporting data in a spatial context;

☐ develop the ability to handle and evaluate different types and sources of information;

☐ develop the skill to think logically, and to present an ordered and coherent argument;

☐ promote an appreciation of the need for understanding, respect and co-operation in conserving the environment and work towards its sustainable development.

ASSESSMENT OBJECTIVES

An assessment objective is an intended area of competence within the subject on which test items will be set. Four are identified in Geography:

1 KNOWLEDGE

Candidates should be able to:

1.1 offer definitions and explanations of relevant geography terms and concepts

1.2 show working knowledge of relevant principles, theories and models

1.3 recall accurately the location and character of selected places and environments

1.4 demonstrate knowledge of the physical and human processes at work.
2 UNDERSTANDING AND APPLICATION

Candidates should be able to:

2.1 understand the complex and interactive nature of physical and human environments

2.2 understand how processes bring changes in systems, distributions and environments

2.3 recognise the distinctiveness and generality of places and environments

2.4 recognise the significance of spatial and time scales

2.5 apply this geographical understanding to new contexts.

3 SKILLS AND ENQUIRY

Candidates should be able to:

3.1 collect, record and interpret information from primary (fieldwork) sources and secondary sources (e.g. statistical data)

3.2 interpret a range of map and diagram techniques displaying geographical information

3.3 assess methods of enquiry and consider the limitations of evidence

3.4 demonstrate skills of analysis, synthesis, explaining and hypothesizing.

4 EVALUATION AND DECISION MAKING

Candidates should be able to:

4.1 assess the effects of geographical processes and change on physical and human environments

4.2 consider the relative success/failure of initiatives and demonstrate a sense of judgement

4.3 analyse and identify different viewpoints and areas of conflict

4.4 undertake decision making processes in Physical and Human Geography.
SCHEME OF ASSESSMENT

The assessment structure will comprise TWO papers:

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<tr>
<th>PAPER 1</th>
<th>PAPER 2</th>
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<td>PHYSICAL GEOGRAPHY</td>
<td>HUMAN GEOGRAPHY</td>
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Each paper will consist of THREE (3) SECTIONS split as follows:

SECTION A: PRACTICALS Two or Three questions will be set and candidates must answer only ONE.

SECTION B: CORE TOPICS (4 IN EACH PAPER) - Six to Eight questions that are structured will be set and candidates will be required to answer any TWO.

SECTION C: OPTIONS (5 IN PAPER 1 AND 4 IN PAPER 2) - One question will be set on each option and candidates will be required to answer any ONE.

In both papers, candidates must answer FOUR questions, one from Section A, two from Section B and one from Section C. Some questions will be based on stimulus material. All questions will carry 25 marks. (NB: SECTION A QUESTIONS WILL BE BASED ON CORE TOPICS IN BOTH PAPERS). Diagrams, maps and statistics should be regarded as important ways of representing data and should be used to illustrate basic principles and concepts particularly in core topics. Candidates should be able to interpret them. Examples should, wherever possible, be drawn from Zimbabwe and other African countries, but where comparability is required (especially in Paper 2), or where exemplification from these regions is absent, candidates are free to take a broader world view.
SPECIFICATION GRID

Links between the assessment objectives and components of the examination are set out in the specification grid below. The objectives are weighted and should be interpreted within the context of individual questions and the paper and examination as a whole.

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<td>TOTAL</td>
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DESCRIPTION OF PAPERS

PAPER 1 (PHYSICAL GEOGRAPHY)

This consists of FOUR CORE topics and FIVE OPTIONS.

CORE TOPICS

1. CLIMATOLOGY
2. HYDROLOGY AND FLUVIAL PROCESSES
3. GEOMORPHOLOGY
4. BIOGEOGRAPHY

Candidates are advised to study these topics in detail, with the view that they will answer the Section A practical based on them as well as Two questions from Section B.

OPTIONS

5. STRUCTURAL LANDFORMS ON A GLOBAL SCALE
6. HAZARDOUS ENVIRONMENTS
7. ARID AND SEMI-ARID ENVIRONMENTS
8. COASTAL GEOMORPHOLOGY
9. GLACIAL AND PERI-GLACIAL ENVIRONMENTS

Candidates are advised to study at least TWO of the Options 5 to 9.
PAPER 2 (HUMAN GEOGRAPHY)

This consists of FOUR CORE topics and FOUR OPTIONS.

CORE TOPICS

1 POPULATION GEOGRAPHY
2 SETTLEMENT DYNAMICS
3 AGRICULTURAL SYSTEMS AND FOOD PRODUCTION
4 MANUFACTURING AND SERVICE INDUSTRIES

Candidates are advised to study these topics in detail, with the view that they will answer the Section A practical based on them as well as TWO questions from Section B.

OPTIONS

5 MINING, FUEL AND POWER
6 ENVIRONMENTAL MANAGEMENT
7 TRANSPORT AND TRADE
8 ECONOMIC DEVELOPMENT AND PLANNING

Candidates are advised to study at least TWO of the Options 5 to 8.

PAPER 1

PHYSICAL GEOGRAPHY

SECTION A: RELEVANT TECHNIQUES AND SKILLS

1 The use of large-scale topographic maps in the study and interpretation of relief, landforms and drainage patterns. The drawing of sketch-maps and sketch profiles. Simple block diagrams.

2 The use of photographs (oblique and ground-level) in the study and interpretation of landforms. Annotated sketch diagrams as aids to photograph interpretation.

3 Field techniques in Physical Geography.
(a) General fieldwork design: identification of the problem; the formulation of an initial hypothesis; data collection and analysis; conclusions (or the reformulation of the hypothesis etc). The role of sampling in fieldwork design.

(b) Specific field techniques:

(i) Field sketching, observation and recording.

(ii) Measurement of landforms (e.g. slope angles and profiles). (iii) Mapping of landforms (e.g. river channels in plan).

(iv) Measurement of sediments (e.g. in stream channels; on alluvial fans; on beaches). Particle rates in different soils; well-level recording).

(v) Basic hydrological techniques (e.g. measurement of stream velocity and discharge; infiltration rates in different soils; well-level recording).

(vi) Simple weather observations (e.g. temperature; rainfall; wind-speed and direction; cloud types).

(vii) Soil mapping. The study of soil profiles in pits and natural exposures. Soil acidity and alkalinity.

(viii) Vegetation mapping (including quadrant survey).

4 Other techniques and methods in Physical Geography.

(i) Graphs: temperature and rainfall graphs; hydrographs; histograms; cumulative frequency graphs; graphs showing the relationship between dependent and independent variables (simple correlation).

(ii) The analysis of patterns (e.g. drainage basin morphometry; drainage density; river sinuosity and the geometry of meanders).

(iii) Distribution maps (e.g. rainfall distribution maps; slope maps; soil maps). The use of isolines on maps.

(iv) Weather maps, including simple synoptic charts and their interpretation. (v) Simple geological maps.

(vi) Miscellaneous techniques (e.g. wind-rose diagrams; rainfall dispersion graphs).
SECTION B: PHYSICAL GEOGRAPHY CORE TOPICS

Candidates are strongly recommended to study Topics 1 to 4 inclusive.

1 CLIMATOLOGY

1.1 Energy Budgets

The six factor 'day model' (incoming solar radiation, reflected solar radiation, energy absorbed into the surface and subsurface, sensible heat transfer, longwave earth radiation, latent heat transfer-evaporation); the four factor 'night model' (long wave earth radiation latent heat transfer, dew, sensible heat transfer, absorbed energy returned to earth).

1.2 The Earth - Atmosphere energy budget

The latitudinal pattern of radiation excesses and deficits and resultant atmospheric transfers, seasonal variations in pressure and wind belts; the influence of latitude, land/sea distribution and ocean currents on the global distribution of temperature, pressure and wind.

1.3 Weather processes and phenomena

Atmospheric moisture (vapour, liquid, solid)
the processes of changes to atmospheric moisture
(evaporation, condensation, freezing, melting, deposition and sublimation) humidity and precipitation (radiation cooling, environmental and adiabatic lapse rates), stability, instability and conditional instability;
resultant weather phenomena (clouds, rain, hail, snow, frost, dew, fog)

1.4 Air masses

Characteristics of air masses, their migration, the ITCZ winds, ocean currents, monsoons; resulting climatic characteristics and distribution of temperature and rainfall in the humid and seasonally humid tropics.

1.5 The human impact

The greenhouse effect and global warming (greenhouse gases and the energy budget climatic and other impacts e.g. cloud seeding acid rain)
urban effects on climate (heat island, humidity, precipitation, pollution, winds).

2 HYDROLOGY AND FLUVIAL PROCESSES

The global hydrological cycle - cascade, showing the inputs, processes and
outputs to be studied as an introduction to this unit.

2.1 The drainage basin system

A study of the terminology and processes operating within drainage basins to be studied in a variety of climatic environments. Inputs, outputs, stores and flows. These should include precipitation, evaporation, evapotranspiration, interception, throughfall, stemflow, infiltration, percolation, overlandflow, throughflow, baseflow, water tables, groundwater, recharge.

2.2 Rainfall - discharge relationships within drainage basins

The concept of water balance, the components of the flood hydrograph, climatic influences on hydrographs to include precipitation type and intensity, temperature evaporation, transpiration, evapotranspiration, antecedent moisture. The influence on hydrographs and stores and flows of drainage basin characteristics including size and shape, drainage density, porosity, permeability of soils, rock type, slopes, vegetation type, landuse.

2.3 River channel processes and landforms

Channel processes of load transport (solution, suspension, saltation and traction), deposition and sedimentation (the Hjulstrom curve), erosion processes (abrasion, corrosion, solution, hydraulic action), velocity and discharge, patterns of flow (laminar, turbulent and helicoidal), channel types (straight, braided, meandering), channel landform (riffle and pool sequences, gorges, waterfalls, bluffs, point bars, flood plains, unpaired terraces, levees, alluvial fans, deltas); long and cross profiles; drainage patterns and their evolution; genetic, generic.

2.4 The human impact

Modification to catchment flows and stores and to channel flows by landuse changes (including urbanisation), abstraction and water storage, the causes and effects of floods and droughts, flood prediction, prevention and amelioration.
3 GEOMORPHOLOGY

3.1 Weathering and rocks

Physical weathering processes (freeze thaw, heating/cooling, wetting/drying, exfoliation/spheroidal, crystal growth, pressure release. Chemical weathering processes (hydrolysis, hydration, carbonation, solution, oxidation organic action- humic acids and chelation). Types of weathering and effectiveness in different climates (Peltier diagram), general factors influencing weathering (climate, rock type, structure, vegetation, relief). Properties of granite and limestone, their chemical composition and physical nature in relation to weathering and erosion.

3.2 Slopes, processes and development

The slope system and types of profile in relation to inputs and outputs; the factors controlling slope form and development (rock type and structure, climate, soil, vegetation, gradient aspect). Slope processes of mass movement, heaves, flows, slides and falls (conditions under which each occurs) elementary slope evolution theories - down wearing, back wearing etc.

3.3 Tropical Landforms

Weathering processes under humid and sub-humid tropical conditions; the development of deep weathering profiles and the basal surface of weathering. The development of landforms in granite (tors, dwalas, bornhardts, kopjes, etchplains, pediplains. The development of landforms in limestone (karst and tower karst).

3.4 The human impact

The impact of human activities on rocks and weathering (quarrying, mining, pollution, acid rain, dumping material on Earth's surface, impact on slope processes and form).

4 TROPICAL ECOSYSTEMS

4.1 Vegetation

Plant communities; development of climax and plagioclimax vegetation in the tropics; vegetation structure of the tropical rainforest and savanna; the development of seres. Biomass productivity - biodiversity, nutrient cycling, fragility (Gerschmel diagrams). Adaptation of plants and animals to the tropical ecosystems.
4.2 Soils

Characteristics of soils; soil forming processes; soil types and profiles (oxisols/latosols, tropical red and brown earths); tropical soil catena (role of slopes in soil formation); eluviation and illuviation; upward capillary movement of water and minerals; soil fertility; soil erosion processes and solutions.

4.3 The human impact

A case study illustrating some of the problems of the sustainable management of areas either within the tropical rainforest ecosystem or within the savanna ecosystem and an evaluation of attempted solutions. Preferable are Zimbabwean case studies.

SECTION C: PHYSICAL GEOGRAPHY OPTIONAL TOPICS

Candidates are advised to study at least TWO of the options 5 - 9.

5 STRUCTURAL LANDFORMS ON A GLOBAL SCALE

Distribution and characteristics of continents and oceans; mountain building, vulcanicity, new and old fold mountains, rift valleys, islands arcs, sedimentary basins and plate tectonics.

6 HAZARDOUS ENVIRONMENTS

6.1 Hazardous Environments resulting from Crustal (tectonic) Movement

Global distribution and the relationship of hazards to plate tectonics (convergent, divergent, conservative plate margins, hot spots). Earthquakes and resultant hazards (shaking, landslides, tsunami). Volcanic hazards; types of eruption and their products (nuées ardentes, lava flows, mudflows, pyroclastic and ash fallout); prediction and monitoring of hazard; perception of risk. Effects on lives and property.

6.2 Hazardous Environments resulting from Mass Movements

Nature and causes of mass movements on slopes leading to hazards that result from slope instability, level of impact, the nature and causes of avalanches and the hazards produced; prediction and monitoring of the hazard and the perception of risk. Effects on lives and property.
6.3 **Hazards resulting from Atmospheric Disturbances**

Distribution of areas most at risk from tropical storms and tornadoes; processes causing the development of tropical storms and tornadoes; related hazards (coastal flooding, severe river floods, landslides, storm surges, high winds, pressure imbalances) prediction, monitoring of hazards and perception of risk. Effects on lives and property.

6.4 **Sustainable Management in Hazardous Environments**

A case study illustrating some of the problems of sustainable management of hazardous environment and an evaluation of attempted or possible solutions.

7 **ARID AND SEMI-ARID ENVIRONMENTS**

7.1 **The Distribution and Climatic Characteristics of Hot Arid and Semi-Arid Environments**

Definitions and causes of aridity, effective precipitation, pressure and wind systems in deserts and influence of ocean currents; degrees of aridity, high wind energy environments, diurnal and seasonal variations in precipitation and temperature, past climatic change (Pleistocene pluvials and evidence for climatic change).

7.2 **Processes producing Desert landforms**

Weathering processes (thermal fracture, exfoliation, chemical weathering); results of weathering on rocks (block and granular disintegration). Processes of erosion, transport and deposition; by wind (corrasion/abrasion, deflation, saltation); by water (hydrological regime, episodic rainfall, flash floods, changing climate, sheet and stream and stream floods); development of sand dune landscapes, development of wadis, alluvial fans, arroyos, pediments, piedmont zone (bahadas, plays, salt lakes, inselbergs).

7.3 **Soils and vegetation**

Soil characteristics, biomass productivity, adaptation of plants and animals to semi-arid and arid areas.

7.4 **Sustainable Management of Arid and Semi-Arid Environments**

A case study illustrating the problems of sustainable management in either arid or semi-arid environment and an evaluation of attempted or possible solutions.
8 COASTAL ENVIRONMENTS

8.1 Wave and Marine Processes

Wave generation and characteristics (fetch, energy, refraction); breaking waves, high
and low energy breakers (constructive and destructive) swash, backwash; marine
erosion (hydraulic action, wave quarrying, corrasion/abrasion, solution, attrition);
wave transportation and deposition, (sediment sources and characteristics, sediment
cells, longshore drift).

8.2 Coastal landforms of clifled and constructive coasts

Cliffs and wave cut platforms; cliff profiles (including caves, arches and stacks) and
their evolution; formation of depositional features (beaches in cross section and plan,
simple and compound spits, tombolos, offshore bars, barrier beaches and islands,
coastal dunes, tidal sedimentation in estuaries and coastal saltmarshes).

8.3 Coral Reefs

Characteristics and distribution of fringing reefs, barrier and atolls; conditions
required for coral growth and development; theories of atoll formation; causes and
results of sea change on coral reefs.

8.4 Sustainable management of coasts

A case study illustrating some of the problems of the sustainable management of a stretch
or stretches of coastline and an evaluation of attempted solutions.

9 GEOMORPHOLOGY OF COLD REGIONS

9.1 Pleistocene glaciation and legacy

Glacial processes of erosion and deposition i.e. grinding, plucking, nivation and
morainic deposition.

9.2 Processes and landforms in periglacial environments

Permafrost, frost action, solifluction (the mollisol and pergellisol), thermokarst,
nivation, water and wind action.

9.3Modification of drainage

Effects of ice sheets, glaciers and moraines
9.4 Sustainable management of cold regions

A case study illustrating some of the problems of the sustainable management of a cold environment and an evaluation of attempted solutions.
HUMAN GEOGRAPHY (PAPER 2)

SECTION A: RELEVANT TECHNIQUES AND SKILLS

Diagrams, maps and statistics should be regarded as important ways of representing collected data and should be used to illustrate basic principles particularly of concepts in Section B (The Human Core topics), and candidates should be able to interpret them.

1 DATA COLLECTION

1.1 General Fieldwork and Project Design

The stages are:

recognition of the issue or problems to be studied; the formulation of one or more hypotheses; data collection in the field or from primary and secondary sources; analysis of the data or evidence, including the testing of hypotheses; conclusions and/or reformulation of the hypotheses.

1.2 Data Collection

(i) Simple methods of random and systematic sampling.

(ii) Fieldwork techniques relevant to individual studies in human geography: (a) questionnaire surveys;

(b) pedestrian/traffic counts;

(c) field identification, classification and plotting of industrial; urban and rural landuse;

(d) identification and plotting of spheres of influence. (iii)

Collection of data from secondary sources:

(a) census reports;

(b) other official publications, including data on production, trade, income and welfare;

(c) maps, including land-use maps and administrative regions; (d)

newspapers;

(e) directories;

(f) appropriate maps and data in the field of physical geography where relevant;
(g) any other suitable methods.

2 THE ANALYSIS, REPRESENTATION AND INTERPRETATION OF DATA

2.1 Calculation, use and significance of the mean, mode and median, including quartiles and quintiles in dispersion diagrams;

2.2 Techniques for showing distributions and patterns in human geography by maps, diagrams, graphs and tables; dot maps, proportional symbols, isoline maps, density maps, bar diagrams or graphs, pie diagrams, flowline maps, age-sex pyramids, etc

SECTION B: HUMAN GEOGRAPHY CORE TOPICS

Candidates will answer two questions from this section and should illustrate their answers where appropriate with reference to case studies drawn from L.E.D.Cs (Less Economically Developed Countries) and M.E.D.Cs (More Economically Developed Countries). A historical perspective may form an instructive context for some of the topics. Where possible Zimbabwean examples are strongly recommended.

1 POPULATION GEOGRAPHY

1.1 Natural Increase as a Component of Population Change

Natural increase rate; birth rate and death rate and the factors affecting levels of fertility and mortality. The interpretation of age/sex pyramids. Population structure (age, gender, dependency and dependency ratio). Demographic transition; a critical appreciation of the demographic transition model. The link between population and development.

1.2 Migration as a Component of Population Change

Internal and international migration (excluding all movement of less than one year's duration); reasons, processes and patterns of migration and impacts on source and receiving areas including population structures. The characteristics and problems of multi-racial societies. Internal and international migration should be studied.

1.3 Population - resource relationships

The concept of population density and distribution. Carrying capacity and the
concept of a population ceiling. The roles of technology and innovation in resource development (e.g. food production); the role of constraints (e.g. war, climatic hazards) in relation to sustaining changing populations. A critical appreciation of the concepts of overpopulation, optimum population and underpopulation. Population theories (e.g. T Malthus' work; Limits to Growth- Club of Rome ideas, Boserup ideas).

1.4 The Management of Population Change

A case study of the home country and other countries' population policies, comprising the two components (natural increase and migration) illustrating the difficulties faced and evaluating the attempted solution(s). The case study or studies should encompass policies on controlling populations and managing the results of population change.

2 SETTLEMENT DYNAMICS

2.1 Relationships between settlements

Functions of rural and urban settlements; rural - urban interaction. Spheres of influence. The settlement hierarchy and factors affecting it; the primate city and urban dominance. Relationships between different sizes of settlements (the size hierarchy). Growth points and service centres the concepts of range, threshold and orders of goods and services (the functional hierarchy); the Central Place Theory by Christaller.

2.2 Changes in Rural Settlements

Contemporary issues in rural settlement in LEDCs and MEDCs including the impacts of rural-urban and urban-rural migration and the consequences of urban growth. A case study of a rural settlement or a rural area illustrating some of the issues of its development and growth (or decline) and evaluating the responses.

2.3 The Changing Structure of Urban Settlements

Factors affecting the location of activities within urban areas (including planning) and how urban locations change over time for retailing, services and manufacturing. Functional zonation and competition for space in urban areas and the concept of bid-rent. The changing Central Business District (C.B.D). Residential segregation and the process basis of residential zonation. The classic urban landuse models should be studied.

2.4 Urban trends and Issues of Urbanisation

The process of urbanisation in LEDCs and MEDCs including counter-urbanisation, new or satellite settlements and re-urbanisation, competition for
land, urban renewal, gentrification, changing accessibility and lifestyles. A case study illustrating the difficulties of and evaluating the attempted solutions in each of the following: shanty towns and/or squatter settlements in a LEDC; the provision of infrastructure for a city; the inner city in a MEDC; strategies for reducing urbanisation in LEDCs; controlling the spread of urban areas in MEDCs.

3 AGRICULTURAL SYSTEMS AND FOOD PRODUCTION

3.1 Factors (physical, social, economic, political) affecting agricultural landuse and practices. Agroecological regions; the roles of irrigation, land tenure and size of holdings; nature of demand and distance from markets, agricultural technology. The concept of an agricultural system with inputs, throughputs, subsystems and outputs. Examples from subsistence and commercial farming systems in tropical regions (shifting cultivation, plantations, small scale mixed/commercial crop farming and ranching/pastoral farming). Intensive and extensive production and agricultural productivity. Issues in the intensification of agriculture and the extension of cultivation in LEDCs. The Von Thunen Landuse Model.

3.2 The Management of Agricultural Change

A case study illustrating the need for, and some of the difficulties in the management of agricultural change including Land Reform policies in one country; at both local and national scales, with an evaluation of the attempted solutions.

4 MANUFACTURING AND SERVICE INDUSTRY

4.1 Factors affecting the growth and location of manufacturing industry and service industry (land, labour, capital, markets, materials, technology, economies and diseconomies of scale, inertia, transport, government policies). Industrial agglomeration: functional linkages, the industrial estate, the export processing zone (EPZ). The growing importance of service industries e.g. banking, insurance, information technology (IT). The informal sector of manufacturing and services: causes, characteristics, location and impact. Include the Industrial location theories of Weber and others.

4.2 Patterns, problems and policies of industrialisation in third world countries.
A case study of industrial policy of one country and consequent changes in the character, location and organisation of its industrial production. Illustrate some of the issues faced and evaluating the attempted solutions.
4.3 The development of tourism and recreation

Reasons for and trends in the growth of domestic and international tourism: the impacts of tourism on the environments, societies and economies (local and national) of tourist destinations, carrying capacity, the multiplier effect. A critical appreciation of the life cycle model of tourism. Recent developments including eco-tourism. The role of tourism in national economic planning.

A case study from one LEDC e.g. Zimbabwe, Zambia and Kenya and from one MEDC e.g. U.K, Japan and Spain.

Landuse for recreational purposes in and near urban settlements and the factors affecting the intensity of recreational landuse.
SECTION C: HUMAN GEOGRAPHY OPTIONAL TOPICS

Candidates must study at least TWO of the human options, which will be assessed in Paper 2, Section C. A question will be set on each option topic. Candidates should illustrate their answers, where appropriate with reference to case studies from LEDCs and MEDCs. A historical perspective may form an instructive context for some of the topics.

1 MINING, FUEL AND POWER

1.1 Mining

Conditions affecting the location and exploitation of mineral resources (including coal, oil and natural gas). Studies should be made with reference to coal, oil and natural gas. Case studies involving iron ores and non-ferrous minerals; the location of processing and refining of mineral products in relation to economic and social factors, including transport. (Regional studies should be made involving areas strongly affected by mining activity, and national economies in which mining is important e.g. Zambia, Venezuela, U.K.); the impact of mining on surrounding areas (e.g. employment, settlement and character of the environment) and on national economic geographies, with special reference to LEDCs.

1.2 Fuel and Power

Renewable and non-renewable energy resources. Factors at the national scale affecting levels of demand for and supply of energy and the balance between different sources (including levels of development, resource endowment, capital, technology, pollution, energy policy). Trends in the consumption of fossil fuels; nuclear power, and renewables (e.g. hydro-electric power, wind, solar power) in LEDCs and MEDCs. The environmental impact of energy production, transport and usage at local and global scales.

1.3 The Management of Energy Supply

A case study of one country's energy strategy illustrating some of the issues of changes in demand and supply, in the production of electrical energy and its location, and evaluating the strategy's success.

ENVIRONMENTAL MANAGEMENT

2.1 Environmental Degradation

Factors leading to the deterioration and pollution of the environment: land, air and water. Factors in the degradation of contrasting rural environments e.g. poor agricultural practices, deforestation and mineral extraction. Factors in the degradation of urban environments (e.g. urbanisation, industrial development,
inadequate infrastructure). Attempts at upgrading the quality of degraded rural and urban environments: the protection of environments at risk.

2.2 The Management of a Degraded Environment

A case study of a degraded environment either rural or urban, illustrating the problems faced, issues in attempts to upgrade the environment, and evaluating the attempted solution(s).

3 TRANSPORT AND TRADE

3.1 Transport

Characteristics of various modes of transport and their relative balance for different purposes in different areas. Factors governing patterns of transport networks. Case studies of transport by road, rail, air and water in selected areas. Improvements in transport systems, problems and impact on surrounding areas. The elementary network theory and its application.

3.2 Trade

Import and export patterns in relation to the development of LEDCs and MEDCs. Global inequalities in trade flows. Visible and invisible imports and exports. Factors affecting trade flows and trading patterns globally (including resource endowment, locational advantage, historical factors such as colonial ties, trade agreements, changes in the global market and innovation).

A case study of the international trading patterns (imports and exports) of one country, illustrating some of the issues in its involvement in international trade and evaluating the country's trading strategy.

4 ECONOMIC DEVELOPMENT AND PLANNING

4.1 National Development

The nature of the primary, secondary, tertiary and quaternary sectors and their roles in economic development. The nature, causes (physical and human) and a critical appreciation of some of the indices of measurement of social and economic inequality.

(Note quaternary industry or the quaternary sector covers activities such as research and development, information technology and high technology industries, training and management consultancy. It is often subsumed into tertiary)
4.2 The Globalisation of Development

An introduction to global patterns of resources, primary production, markets and the international spatial division of labour. The connections between industrial growth in some LEDCs and deindustrialization in MEDCs. Factors affecting the growth and spatial structure of transnational corporations (TNCs); distribution of global inequalities in social and economic well being: a case study of the global organisation and operation of one TNC.

4.3 Regional Development within Countries

Regional disparities in social and economic development. The concept of core-periphery. The process of cumulative causation from initial advantage(s): spread and backwash effects.

4.4 The Management of Development

A case study of one country's policy for social and economic development at either the national or regional scale (between the different regions within that country) illustrating some of the difficulties faced and evaluating the attempted solutions.